Department of Defense
Fiscal Year (FY) 2020 Budget Estimates

March 2019

Navy

Justification Book Volume 5 of 5

Research, Development, Test & Evaluation, Navy

Budget Activity 7

The estimated cost of this report for the Department of the Navy (DON) is $45,612.

The estimated total cost for supporting the DON budget justification material is approximately $1,803,116 for the 2019 fiscal year. This includes $81,351 in supplies and $1,721,765 in labor.

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Research, Development, Test and Evaluation, Navy

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, $20,434,909,000 to remain available for obligation until September 30, 2021.

FY 2020 Overseas Contingency Operations funding can be separated into the following categories:

OCO for Direct War Costs ($37,000,000): OCO for Direct War costs are those combat or direct combat support costs that will not continue to be expended once combat operations end at major contingency locations.

OCO for Enduring Requirements ($127,410,000): OCO for Enduring Requirements are enduring in-theater and in-CONUS costs that will likely remain after combat operations cease, and have previously been funded in OCO.

OCO for Base Requirements ($0): OCO for Base Requirements is OCO funding for base budget requirements in support of the National Defense Strategy. The Budget requests these funds in OCO to comply with the base budget defense caps included in the Budget Control Act of 2011.

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Department of Defense
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
Research, Development, Test & Eval, Navy	18,465,332	18,490,002	167,812	18,657,814
Total Research, Development, Test & Evaluation	18,465,332	18,490,002	167,812	18,657,814

Department of Defense
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Appropriation	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Research, Development, Test & Eval, Navy	20,270,499		164,410	164,410	20,434,909
Total Research, Development, Test & Evaluation	20,270,499		164,410	164,410	20,434,909

Department of Defense
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
Basic Research	604,634	679,772		679,772
Applied Research	975,419	1,018,795		1,018,795
Advanced Technology Development	900,071	851,710		851,710
Advanced Component Development & Prototypes	4,210,640	4,139,479	33,300	4,172,779
System Development & Demonstration	6,037,909	5,863,466	1,100	5,864,566
Management Support	1,388,936	1,023,070		1,023,070
Operational Systems Development	4,347,723	4,913,710	133,412	5,047,122
Total Research, Development, Test & Evaluation	18,465,332	18,490,002	167,812	18,657,814
Summary Recap of FYDP Programs				
Strategic Forces	192,820	240,310		240,310
General Purpose Forces	1,514,837	1,914,231	16,130	1,930,361
Intelligence and Communications	816,404	608,772		608,772
Research and Development	13,991,927	13,937,905	34,400	13,972,305
Central Supply and Maintenance	40,084	73,844		73,844
Administration and Associated Activities	1,820	1,579		1,579
Space	49,738	42,858		42,858
Classified Programs	1,857,702	1,670,503	117,282	1,787,785
Total Research, Development, Test & Evaluation	18,465,332	18,490,002	167,812	18,657,814

Department of Defense
FY 2020 President's Budget
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Total Obligational Authority
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Basic Research	605,978				605,978
Applied Research	936,453				936,453
Advanced Technology Development	742,210				742,210
Advanced Component Development & Prototypes	5,559,062		40,006	40,006	5,599,068
System Development & Demonstration	6,332,033		1,122	1,122	6,333,155
Management Support	990,464				990,464
Operational Systems Development	5,104,299		123,282	123,282	5,227,581
Total Research, Development, Test & Evaluation	20,270,499		164,410	164,410	20,434,909
Summary Recap of FYDP Programs					
Strategic Forces	239,019				239,019
General Purpose Forces	1,835,959		15,000	15,000	1,850,959
Intelligence and Communications	692,089				692,089
Research and Development	15,828,006		41,128	41,128	15,869,134
Central Supply and Maintenance	44,961				44,961
Administration and Associated Activities	1,460				1,460
Space	15,868				15,868
Classified Programs	1,613,137		108,282	108,282	1,721,419
Total Research, Development, Test & Evaluation	20,270,499		164,410	164,410	20,434,909

Department of the Navy
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
Basic Research	604,634	679,772		679,772
Applied Research	975,419	1,018,795		1,018,795
Advanced Technology Development	900,071	851,710		851,710
Advanced Component Development & Prototypes	4,210,640	4,139,479	33,300	4,172,779
System Development & Demonstration	6,037,909	5,863,466	1,100	5,864,566
Management Support	1,388,936	1,023,070		1,023,070
Operational Systems Development	4,347,723	4,913,710	133,412	5,047,122
Total Research, Development, Test & Evaluation	18,465,332	18,490,002	167,812	18,657,814
Summary Recap of FYDP Programs				
Strategic Forces	192,820	240,310		240,310
General Purpose Forces	1,514,837	1,914,231	16,130	1,930,361
Intelligence and Communications	816,404	608,772		608,772
Research and Development	13,991,927	13,937,905	34,400	13,972,305
Central Supply and Maintenance	40,084	73,844		73,844
Administration and Associated Activities	1,820	1,579		1,579
Space	49,738	42,858		42,858
Classified Programs	1,857,702	1,670,503	117,282	1,787,785
Total Research, Development, Test & Evaluation	18,465,332	18,490,002	167,812	18,657,814

Department of the Navy
FY 2020 President's Budget
Exhibit R-1 FY 2020 President's Budget
Total Obligational Authority
(Dollars in Thousands)

Summary Recap of Budget Activities	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Basic Research	605,978				605,978
Applied Research	936,453				936,453
Advanced Technology Development	742,210				742,210
Advanced Component Development & Prototypes	5,559,062		40,006	40,006	5,599,068
System Development & Demonstration	6,332,033		1,122	1,122	6,333,155
Management Support	990,464				990,464
Operational Systems Development	5,104,299		123,282	123,282	5,227,581
Total Research, Development, Test & Evaluation	20,270,499		164,410	164,410	20,434,909
Summary Recap of FYDP Programs					
Strategic Forces	239,019				239,019
General Purpose Forces	1,835,959		15,000	15,000	1,850,959
Intelligence and Communications	692,089				692,089
Research and Development	15,828,006		41,128	41,128	15,869,134
Central Supply and Maintenance	44,961				44,961
Administration and Associated Activities	1,460				1,460
Space	15,868				15,868
Classified Programs	1,613,137		108,282	108,282	1,721,419
Total Research, Development, Test & Evaluation	20,270,499		164,410	164,410	20,434,909

Department of the Navy
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Total Obligational Authority
(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Sec
1	0601103N	University Research Initiatives	01	137,515	161,433		161,433	U
2	0601152N	In-House Laboratory Independent Research	01	19,035	19,237		19,237	U
3	0601153N	Defense Research Sciences	01	448,084	499,102		499,102	U
	Basic	Research		604,634	679,772		679,772	
4	0602114N	Power Projection Applied Research	02	23,028	27,643		27,643	U
5	0602123N	Force Protection Applied Research	02	182,614	180,549		180,549	U
6	0602131M	Marine Corps Landing Force Technology	02	54,526	63,212		63,212	U
7	0602235N	Common Picture Applied Research	02	35,846	36,348		36,348	U
8	0602236N	Warfighter Sustainment Applied Research	02	48,606	65,782		65,782	U
9	0602271N	Electromagnetic Systems Applied Research	02	83,640	76,497		76,497	U
10	0602435N	Ocean Warfighting Environment Applied Research	02	72,530	89,998		89,998	U
11	0602651M	Joint Non-Lethal Weapons Applied Research	02	6,230	6,299		6,299	U
12	0602747N	Undersea Warfare Applied Research	02	59,644	78,049		78,049	U
13	0602750N	Future Naval Capabilities Applied Research	02	147,219	137,701		137,701	U
14	0602782N	Mine and Expeditionary Warfare Applied Research	02	35,430	38,214		38,214	U
15	0602792N	Innovative Naval Prototypes (INP) Applied Research	02	160,884	154,085		154,085	U

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Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Sec
1	0601103N	University Research Initiatives	01	116,850				116,850	U
2	0601152N	In-House Laboratory Independent Research	01	19,121				19,121	U
3	0601153N	Defense Research Sciences	01	470,007				470,007	U
	Basic	Research		605,978				605,978	
4	0602114N	Power Projection Applied Research	02	18,546				18,546	U
5	0602123N	Force Protection Applied Research	02	119,517				119,517	U
6	0602131M	Marine Corps Landing Force Technology	02	56,604				56,604	U
7	0602235N	Common Picture Applied Research	02	49,297				49,297	U
8	0602236N	Warfighter Sustainment Applied Research	02	63,825				63,825	U
9	0602271N	Electromagnetic Systems Applied Research	02	83,497				83,497	U
10	0602435N	Ocean Warfighting Environment Applied Research	02	63,894				63,894	U
11	0602651M	Joint Non-Lethal Weapons Applied Research	02	6,346				6,346	U
12	0602747N	Undersea Warfare Applied Research	02	57,075				57,075	U
13	0602750N	Future Naval Capabilities Applied Research	02	154,755				154,755	U
14	0602782N	Mine and Expeditionary Warfare Applied Research	02	36,074				36,074	U
15	0602792N	Innovative Naval Prototypes (INP) Applied Research	02	153,062				153,062	U

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Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Sec
16	0602861N	Science and Technology Management - ONR Field Acitivities	02	65,222	64,418		64,418	U
		Applied Research		975,419	1,018,795		1,018,795	
17	0603123N	Force Protection Advanced Technology	03	52,785	32,615		32,615	U
18	0603271N	Electromagnetic Systems Advanced Technology	03	9,231	8,804		8,804	U
19	0603640M	USMC Advanced Technology Demonstration (ATD)	03	164,992	174,809		174,809	U
20	0603651M	Joint Non-Lethal Weapons Technology Development	03	13,090	13,313		13,313	U
21	0603673N	Future Naval Capabilities Advanced Technology Development	03	215,946	214,184		214,184	U
22	0603680N	Manufacturing Technology Program	03	66,173	58,657		58,657	U
23	0603729N	Warfighter Protection Advanced Technology	03	42,895	41,377		41,377	U
24	0603747N	Undersea Warfare Advanced Technology	03	9,657				U
25	0603758N	Navy Warfighting Experiments and Demonstrations	03	63,867	65,885		65,885	U
26	0603782N	Mine and Expeditionary Warfare Advanced Technology	03	14,826	39,672		39,672	U
27	0603801N	Innovative Naval Prototypes (INP) Advanced Technology Development	03	246,609	202,394		202,394	U
		Advanced Technology Development		900,071	851,710		851,710	
28	0603207N	Air/Ocean Tactical Applications	04	47,422	29,747		29,747	U
29	0603216N	Aviation Survivability	04	5,450	7,050		7,050	U

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Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Sec
16	0602861N	Science and Technology Management - ONR Field Acitivities	02	73,961				73,961	U
		Applied Research		936,453				936,453	
17	0603123N	Force Protection Advanced Technology	03	35,286				35,286	U
18	0603271N	Electromagnetic Systems Advanced Technology	03	9,499				9,499	U
19	0603640M	USMC Advanced Technology Demonstration (ATD)	03	172,847				172,847	U
20	0603651M	Joint Non-Lethal Weapons Technology Development	03	13,307				13,307	U
21	0603673N	Future Naval Capabilities Advanced Technology Development	03	231,907				231,907	U
22	0603680N	Manufacturing Technology Program	03	60,138				60,138	U
23	0603729N	Warfighter Protection Advanced Technology	03	4,849				4,849	U
24	0603747N	Undersea Warfare Advanced Technology	03						U
25	0603758N	Navy Warfighting Experiments and Demonstrations	03	67,739				67,739	U
26	0603782N	Mine and Expeditionary Warfare Advanced Technology	03	13,335				13,335	U
27	0603801N	Innovative Naval Prototypes (INP) Advanced Technology Development	03	133,303				133,303	U
		Advanced Technology Development		742,210				742,210	
28	0603207N	Air/Ocean Tactical Applications	04	32,643		2,400	2,400	35,043	U
29	0603216N	Aviation Survivability	04	11,919				11,919	U

Department of the Navy
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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Sec
30	0603251N	Aircraft Systems	04	693	793		793	U
31	0603254N	ASW Systems Development	04	7,466	7,044		7,044	U
32	0603261N	Tactical Airborne Reconnaissance	04	3,692	3,540		3,540	U
33	0603382N	Advanced Combat Systems Technology	04	4,450	39,240		39,240	U
34	0603502N	Surface and Shallow Water Mine Countermeasures	04	69,906	120,348		120,348	U
35	0603506N	Surface Ship Torpedo Defense	04	24,174	7,100		7,100	U
36	0603512N	Carrier Systems Development	04	9,184	5,440		5,440	U
37	0603525N	PILOT FISH	04	111,278	136,533		136,533	U
38	0603527N	RETRACT LARCH	04	32,608	11,745	18,000	29,745	U
39	0603536N	RETRACT JUNIPER	04	126,210	113,679		113,679	U
40	0603542N	Radiological Control	04	716	740		740	U
41	0603553N	Surface ASW	04	1,092	1,122		1,122	U
42	0603561N	Advanced Submarine System Development	04	91,927	105,809		105,809	U
43	0603562N	Submarine Tactical Warfare Systems	04	13,597	12,374		12,374	U
44	0603563N	Ship Concept Advanced Design	04	23,856	74,603		74,603	U
45	0603564N	Ship Preliminary Design & Feasibility Studies	04	18,369	13,348		13,348	U
46	0603570N	Advanced Nuclear Power Systems	04	329,500	256,137		256,137	U
47	0603573N	Advanced Surface Machinery Systems	04	22,406	27,109		27,109	U
48	0603576N	CHALK EAGLE	04	188,927	29,353		29,353	U

Department of the Navy
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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Sec
30	0603251N	Aircraft Systems	04	1,473				1,473	U
31	0603254N	ASW Systems Development	04	7,172				7,172	U
32	0603261N	Tactical Airborne Reconnaissance	04	3,419				3,419	U
33	0603382N	Advanced Combat Systems Technology	04	64,694				64,694	U
34	0603502N	Surface and Shallow Water Mine Countermeasures	04	507,000				507,000	U
35	0603506N	Surface Ship Torpedo Defense	04	15,800				15,800	U
36	0603512N	Carrier Systems Development	04	4,997				4,997	U
37	0603525N	PILOT FISH	04	291,148				291,148	U
38	0603527N	RETRACT LARCH	04	11,980		22,000	22,000	33,980	U
39	0603536N	RETRACT JUNIPER	04	129,163				129,163	U
40	0603542N	Radiological Control	04	689				689	U
41	0603553N	Surface ASW	04	1,137				1,137	U
42	0603561N	Advanced Submarine System Development	04	148,756				148,756	U
43	0603562N	Submarine Tactical Warfare Systems	04	11,192				11,192	U
44	0603563N	Ship Concept Advanced Design	04	81,846				81,846	U
45	0603564N	Ship Preliminary Design & Feasibility Studies	04	69,084				69,084	U
46	0603570N	Advanced Nuclear Power Systems	04	181,652				181,652	U
47	0603573N	Advanced Surface Machinery Systems	04	25,408				25,408	U
48	0603576N	CHALK EAGLE	04	64,877				64,877	U

Department of the Navy
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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Sec
49	0603581N	Littoral Combat Ship (LCS)	04	49,308	37,997		37,997	U
50	0603582N	Combat System Integration	04	15,471	16,351		16,351	U
51	0603595N	Ohio Replacement	04	775,624	542,846		542,846	U
52	0603596N	LCS Mission Modules	04	100,470	103,559		103,559	U
53	0603597N	Automated Test and Analysis	04	24,145	37,931		37,931	U
54	0603599N	Frigate Development	04	137,655	132,775		132,775	U
55	0603609N	Conventional Munitions	04	13,699	9,307		9,307	U
56	0603635M	Marine Corps Ground Combat/Support System	04	771				U
57	0603654N	Joint Service Explosive Ordnance Development	04	77,409	47,857	13,900	61,757	U
58	0603713N	Ocean Engineering Technology Development	04	8,853	5,915		5,915	U
59	0603721N	Environmental Protection	04	23,237	19,811		19,811	U
60	0603724N	Navy Energy Program	04	42,425	32,656		32,656	U
61	0603725N	Facilities Improvement	04	2,794	5,301		5,301	U
62	0603734N	CHALK CORAL	04	237,402	267,477		267,477	U
63	0603739N	Navy Logistic Productivity	04	2,882	2,913		2,913	U
64	0603746N	RETRACT MAPLE	04	287,865	318,878		318,878	U
65	0603748N	LINK PLUMERIA	04	375,595	381,268		381,268	U
66	0603751N	RETRACT ELM	04	52,080	58,192		58,192	U
67	0603764N	LINK EVERGREEN	04	47,115				U

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Sec
49	0603581N	Littoral Combat Ship (LCS)	04	9,934				9,934	U
50	0603582N	Combat System Integration	04	17,251				17,251	U
51	0603595N	Ohio Replacement	04	419,051				419,051	U
52	0603596N	LCS Mission Modules	04	108,505				108,505	U
53	0603597N	Automated Test and Analysis	04	7,653				7,653	U
54	0603599N	Frigate Development	04	59,007				59,007	U
55	0603609N	Conventional Munitions	04	9,988				9,988	U
56	0603635M	Marine Corps Ground Combat/Support System	04	86,464				86,464	U
57	0603654N	Joint Service Explosive Ordnance Development	04	33,478		14,178	14,178	47,656	U
58	0603713N	Ocean Engineering Technology Development	04	5,619				5,619	U
59	0603721N	Environmental Protection	04	20,564				20,564	U
60	0603724N	Navy Energy Program	04	26,514				26,514	U
61	0603725N	Facilities Improvement	04	3,440				3,440	U
62	0603734N	CHALK CORAL	04	346,800				346,800	U
63	0603739N	Navy Logistic Productivity	04	3,857				3,857	U
64	0603746N	RETRACT MAPLE	04	258,519				258,519	U
65	0603748N	LINK PLUMERIA	04	403,909				403,909	U
66	0603751N	RETRACT ELM	04	63,434				63,434	U
67	0603764N	LINK EVERGREEN	04	184,110				184,110	U

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(Dollars in Thousands)

Appropriation: 1319N Research, Development, Test & Eval, Navy

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Sec
68	0603790N	NATO Research and Development	04	8,752	9,652		9,652	U
69	0603795N	Land Attack Technology	04	16,684	5,700	1,400	7,100	U
70	0603851M	Joint Non-Lethal Weapons Testing	04	23,934	27,581		27,581	U
71	0603860N	Joint Precision Approach and Landing Systems - Dem/Val	04	103,984	101,566		101,566	U
72	0603925N	Directed Energy and Electric Weapon Systems	04	92,856	142,814		142,814	U
73	0604014N	F/A -18 Infrared Search and Track (IRST)	04		108,689		108,689	U
74	0604027N	Digital Warfare Office	04	14,476	20,000		20,000	U
75	0604028N	Small and Medium Unmanned Undersea Vehicles	04		16,717		16,717	U
76	0604029N	Unmanned Undersea Vehicle Core Technologies	04		27,483		27,483	U
77	0604030N	Rapid Prototyping, Experimentation and Demonstration.	04	25,225	28,596		28,596	U
78	0604031N	Large Unmanned Undersea Vehicles	04	23,886	60,304		60,304	U
79	0604112N	Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78 - 80)	04	82,549	83,121		83,121	U
80	0604126N	Littoral Airborne MCM	04	11,314	14,625		14,625	U
81	0604127N	Surface Mine Countermeasures	04	12,525	15,527		15,527	U
82	0604272N	Tactical Air Directional Infrared Countermeasures (TADIRCM)	04	51,311	47,278		47,278	U
83	0604286M	Marine Corps Additive Manufacturing Technology Development	04	6,168				U

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68	0603790N	NATO Research and Development	04	7,697				7,697	U
69	0603795N	Land Attack Technology	04	9,086		1,428	1,428	10,514	U
70	0603851M	Joint Non-Lethal Weapons Testing	04	28,466				28,466	U
71	0603860N	Joint Precision Approach and Landing Systems - Dem/Val	04	51,341				51,341	U
72	0603925N	Directed Energy and Electric Weapon Systems	04	118,169				118,169	U
73	0604014N	F/A -18 Infrared Search and Track (IRST)	04	113,456				113,456	U
74	0604027N	Digital Warfare Office	04	50,120				50,120	U
75	0604028N	Small and Medium Unmanned Undersea Vehicles	04	32,527				32,527	U
76	0604029N	Unmanned Undersea Vehicle Core Technologies	04	54,376				54,376	U
77	0604030N	Rapid Prototyping, Experimentation and Demonstration.	04	36,197				36,197	U
78	0604031N	Large Unmanned Undersea Vehicles	04	68,310				68,310	U
79	0604112N	Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78 - 80)	04	121,310				121,310	U
80	0604126N	Littoral Airborne MCM	04	17,248				17,248	U
81	0604127N	Surface Mine Countermeasures	04	18,735				18,735	U
82	0604272N	Tactical Air Directional Infrared Countermeasures (TADIRCM)	04	68,346				68,346	U
83	0604286M	Marine Corps Additive Manufacturing Technology Development	04						U

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84	0604289M	Next Generation Logistics	04		6,073		6,073	U
85	0604320M	Rapid Technology Capability Prototype	04	16,443	7,107		7,107	U
86	0604454N	LX (R)	04	9,431	5,549		5,549	U
87	0604536N	Advanced Undersea Prototyping	04	64,038	112,669		112,669	U
88	0604636N	Counter Unmanned Aircraft Systems (C-UAS)	04					U
89	0604659N	Precision Strike Weapons Development Program	04	20,279	91,833		91,833	U
90	0604707N	Space and Electronic Warfare (SEW) Architecture/Engineering Support	04	41,214	7,230		7,230	U
91	0604786N	Offensive Anti-Surface Warfare Weapon Development	04	163,843	139,261		139,261	U
92	0303354N	ASW Systems Development - MIP	04	8,278	8,889		8,889	U
93	0304240M	Advanced Tactical Unmanned Aircraft System	04	5,200	17,561		17,561	U
94	0304240N	Advanced Tactical Unmanned Aircraft System	04		9,300		9,300	U
95	0304270N	Electronic Warfare Development - MIP	04	527	466		466	U
		Advanced Component Development & Prototypes		4,210,640	4,139,479	33,300	4,172,779	
96	0603208N	Training System Aircraft	05	16,343	12,798		12,798	U
97	0604212N	Other Helo Development	05	26,423	23,579		23,579	U
98	0604214M	AV-8B Aircraft - Eng Dev	05		46,363		46,363	U
99	0604214N	AV-8B Aircraft - Eng Dev	05	41,261				U

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84	0604289M	Next Generation Logistics	04	4,420				4,420	U
85	0604320M	Rapid Technology Capability Prototype	04	4,558				4,558	U
86	0604454N	LX (R)	04	12,500				12,500	U
87	0604536N	Advanced Undersea Prototyping	04	181,967				181,967	U
88	0604636N	Counter Unmanned Aircraft Systems (C-UAS)	04	5,500				5,500	U
89	0604659N	Precision Strike Weapons Development Program	04	718,148				718,148	U
90	0604707N	Space and Electronic Warfare (SEW) Architecture/Engineering Support	04	5,263				5,263	U
91	0604786N	Offensive Anti-Surface Warfare Weapon Development	04	65,419				65,419	U
92	0303354N	ASW Systems Development - MIP	04	9,991				9,991	U
93	0304240M	Advanced Tactical Unmanned Aircraft System	04	21,157				21,157	U
94	0304240N	Advanced Tactical Unmanned Aircraft System	04						U
95	0304270N	Electronic Warfare Development - MIP	04	609				609	U
		Advanced Component Development & Prototypes		5,559,062		40,006	40,006	5,599,068	
96	0603208N	Training System Aircraft	05	15,514				15,514	U
97	0604212N	Other Helo Development	05	28,835				28,835	U
98	0604214M	AV-8B Aircraft - Eng Dev	05	27,441				27,441	U
99	0604214N	AV-8B Aircraft - Eng Dev	05						U

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100	0604215N	Standards Development	05	2,711	3,771		3,771	U
101	0604216N	Multi-Mission Helicopter Upgrade Development	05	5,313	16,611		16,611	U
102	0604218N	Air/Ocean Equipment Engineering	05	5,583	15,582		15,582	U
103	0604221N	P-3 Modernization Program	05	1,331	2,134		2,134	U
104	0604230N	Warfare Support System	05	19,004	9,729		9,729	U
105	0604231N	Tactical Command System	05	37,609	54,300		54,300	U
106	0604234N	Advanced Hawkeye	05	283,497	210,565		210,565	U
107	0604245M	H-1 Upgrades	05		54,320		54,320	U
108	0604245N	H-1 Upgrades	05	59,806				U
109	0604261N	Acoustic Search Sensors	05	36,310	42,485		42,485	U
110	0604262N	V-22A	05	176,804	135,504		135,504	U
111	0604264N	Air Crew Systems Development	05	7,174	30,980		30,980	U
112	0604269N	EA-18	05	137,029	242,719		242,719	U
113	0604270N	Electronic Warfare Development	05	50,613	83,624		83,624	U
114	0604273M	Executive Helo Development	05		245,064		245,064	U
115	0604273N	Executive Helo Development	05	430,647				U
116	0604274N	Next Generation Jammer (NGJ)	05	584,538	449,429		449,429	U
117	0604280N	Joint Tactical Radio System - Navy (JTRS-Navy)	05	5,172	3,272		3,272	U
118	0604282N	Next Generation Jammer (NGJ) Increment II	05	55,194	93,482		93,482	U

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100	0604215N	Standards Development	05	3,642				3,642	U
101	0604216N	Multi-Mission Helicopter Upgrade Development	05	19,196				19,196	U
102	0604218N	Air/Ocean Equipment Engineering	05						U
103	0604221N	P-3 Modernization Program	05						U
104	0604230N	Warfare Support System	05	8,601				8,601	U
105	0604231N	Tactical Command System	05	77,232				77,232	U
106	0604234N	Advanced Hawkeye	05	232,752				232,752	U
107	0604245M	H-1 Upgrades	05	65,359				65,359	U
108	0604245N	H-1 Upgrades	05						U
109	0604261N	Acoustic Search Sensors	05	47,013				47,013	U
110	0604262N	V-22A	05	185,105				185,105	U
111	0604264N	Air Crew Systems Development	05	21,172				21,172	U
112	0604269N	EA-18	05	143,585				143,585	U
113	0604270N	Electronic Warfare Development	05	116,811				116,811	U
114	0604273M	Executive Helo Development	05	187,436				187,436	U
115	0604273N	Executive Helo Development	05						U
116	0604274N	Next Generation Jammer (NGJ)	05	524,261				524,261	U
117	0604280N	Joint Tactical Radio System - Navy (JTRS-Navy)	05	192,345				192,345	U
118	0604282N	Next Generation Jammer (NGJ) Increment II	05	111,068				111,068	U

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119	0604307N	Surface Combatant Combat System Engineering	05	340,760	379,116		379,116	U
120	0604311N	LPD-17 Class Systems Integration	05	665	939		939	U
121	0604329N	Small Diameter Bomb (SDB)	05	99,286	96,980		96,980	U
122	0604366N	Standard Missile Improvements	05	114,802	190,881		190,881	U
123	0604373N	Airborne MCM	05	15,203	8,351		8,351	U
124	0604378N	Naval Integrated Fire Control - Counter Air Systems Engineering	05	24,801	33,429		33,429	U
125	0604501N	Advanced Above Water Sensors	05	84,507	33,884		33,884	U
126	0604503N	SSN-688 and Trident Modernization	05	142,167	126,932		126,932	U
127	0604504N	Air Control	05	68,012	61,498		61,498	U
128	0604512N	Shipboard Aviation Systems	05	174,034	13,710		13,710	U
129	0604518N	Combat Information Center Conversion	05	4,294	19,263		19,263	U
130	0604522N	Air and Missile Defense Radar (AMDR) System	05	49,643	27,008		27,008	U
131	0604530N	Advanced Arresting Gear (AAG)	05		172,173		172,173	U
132	0604558N	New Design SSN	05	117,887	180,233		180,233	U
133	0604562N	Submarine Tactical Warfare System	05	44,703	80,324		80,324	U
134	0604567N	Ship Contract Design/ Live Fire T&E	05	65,857	71,062		71,062	U
135	0604574N	Navy Tactical Computer Resources	05	4,745	4,642		4,642	U
136	0604580N	Virginia Payload Module (VPM)	05	70,579				U
137	0604601N	Mine Development	05	24,640	21,747		21,747	U

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119	0604307N	Surface Combatant Combat System Engineering	05	415,625				415,625	U
120	0604311N	LPD-17 Class Systems Integration	05	640				640	U
121	0604329N	Small Diameter Bomb (SDB)	05	50,096				50,096	U
122	0604366N	Standard Missile Improvements	05	232,391				232,391	U
123	0604373N	Airborne MCM	05	10,916				10,916	U
124	0604378N	Naval Integrated Fire Control - Counter Air Systems Engineering	05	33,379				33,379	U
125	0604501N	Advanced Above Water Sensors	05	34,554				34,554	U
126	0604503N	SSN-688 and Trident Modernization	05	84,663				84,663	U
127	0604504N	Air Control	05	44,923				44,923	U
128	0604512N	Shipboard Aviation Systems	05	10,632				10,632	U
129	0604518N	Combat Information Center Conversion	05	16,094				16,094	U
130	0604522N	Air and Missile Defense Radar (AMDR) System	05	55,349				55,349	U
131	0604530N	Advanced Arresting Gear (AAG)	05	123,490				123,490	U
132	0604558N	New Design SSN	05	121,010				121,010	U
133	0604562N	Submarine Tactical Warfare System	05	62,426				62,426	U
134	0604567N	Ship Contract Design/ Live Fire T&E	05	46,809				46,809	U
135	0604574N	Navy Tactical Computer Resources	05	3,692				3,692	U
136	0604580N	Virginia Payload Module (VPM)	05						U
137	0604601N	Mine Development	05	28,964				28,964	U

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138	0604610N	Lightweight Torpedo Development	05	21,057	63,147		63,147	U
139	0604654N	Joint Service Explosive Ordnance Development	05	7,449	7,107		7,107	U
140	0604657M	USMC Ground Combat/Supporting Arms Systems - Eng Dev	05					U
141	0604703N	Personnel, Training, Simulation, and Human Factors	05	24,229	6,539		6,539	U
142	0604727N	Joint Standoff Weapon Systems	05	418	441		441	U
143	0604755N	Ship Self Defense (Detect & Control)	05	160,475	180,391	1,100	181,491	U
144	0604756N	Ship Self Defense (Engage: Hard Kill)	05	214,132	193,244		193,244	U
145	0604757N	Ship Self Defense (Engage: Soft Kill/EW)	05	126,037	120,210		120,210	U
146	0604761N	Intelligence Engineering	05	44,855	25,965		25,965	U
147	0604771N	Medical Development	05	36,392	38,095		38,095	U
148	0604777N	Navigation/ID System	05	74,984	126,026		126,026	U
149	0604800M	Joint Strike Fighter (JSF) - EMD	05	157,162	66,566		66,566	U
150	0604800N	Joint Strike Fighter (JSF) - EMD	05	105,648	65,494		65,494	U
151	0604810M	Joint Strike Fighter Follow On Modernization (FoM) - Marine Corps	05	139,369				U
152	0604810N	Joint Strike Fighter Follow On Modernization (FoM) - Navy	05	138,308				U
153	0605013M	Information Technology Development	05	14,497	11,030		11,030	U
154	0605013N	Information Technology Development	05	120,387	242,110		242,110	U

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138	0604610N	Lightweight Torpedo Development	05	148,349				148,349	U
139	0604654N	Joint Service Explosive Ordnance Development	05	8,237				8,237	U
140	0604657M	USMC Ground Combat/Supporting Arms Systems - Eng Dev	05	22,000				22,000	U
141	0604703N	Personnel, Training, Simulation, and Human Factors	05	5,500				5,500	U
142	0604727N	Joint Standoff Weapon Systems	05	18,725				18,725	U
143	0604755N	Ship Self Defense (Detect & Control)	05	192,603		1,122	1,122	193,725	U
144	0604756N	Ship Self Defense (Engage: Hard Kill)	05	137,268				137,268	U
145	0604757N	Ship Self Defense (Engage: Soft Kill/EW)	05	97,363				97,363	U
146	0604761N	Intelligence Engineering	05	26,710				26,710	U
147	0604771N	Medical Development	05	8,181				8,181	U
148	0604777N	Navigation/ID System	05	40,755				40,755	U
149	0604800M	Joint Strike Fighter (JSF) - EMD	05	1,710				1,710	U
150	0604800N	Joint Strike Fighter (JSF) - EMD	05	1,490				1,490	U
151	0604810M	Joint Strike Fighter Follow On Modernization (FoM) - Marine Corps	05						U
152	0604810N	Joint Strike Fighter Follow On Modernization (FoM) - Navy	05						U
153	0605013M	Information Technology Development	05	1,494				1,494	U
154	0605013N	Information Technology Development	05	384,162				384,162	U

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155	0605024N	Anti-Tamper Technology Support	05	3,900	5,618		5,618	U
156	0605212M	CH-53K RDTE	05		336,945		336,945	U
157	0605212N	CH-53K RDTE	05	329,367				U
158	0605215N	Mission Planning	05	36,108	32,714		32,714	U
159	0605217N	Common Avionics	05	47,338	51,486		51,486	U
160	0605220N	Ship to Shore Connector (SSC)	05	31,583	1,444		1,444	U
161	0605327N	T-AO 205 Class	05	1,895	1,298		1,298	U
162	0605414N	Unmanned Carrier Aviation (UCA)	05	194,176	518,942		518,942	U
163	0605450M	Joint Air-to-Ground Missile (JAGM)	05		16,559		16,559	U
164	0605450N	Joint Air-to-Ground Missile (JAGM)	05	14,457				U
165	0605500N	Multi-mission Maritime Aircraft (MMA)	05	11,422	34,196		34,196	U
166	0605504N	Multi-Mission Maritime (MMA) Increment III	05	123,752	163,809		163,809	U
167	0605611M	Marine Corps Assault Vehicles System Development & Demonstration	05	150,381	66,137		66,137	U
168	0605813M	Joint Light Tactical Vehicle (JLTV) System Development & Demonstration	05	19,467				U
169	0204202N	DDG-1000	05	134,664	140,264		140,264	U
170	0303267N	Auctioned Spectrum Relocation Fund***	05	97,558				U
171	0303467N	SENSR Spectrum Pipeline SRF***	05	1,773				U
172	0304785N	Tactical Cryptologic Systems	05	22,762	42,398		42,398	U

***Funding in this Program Element was transferred during the year of execution from the Spectrum Relocation Fund (SRF) in support of the Advanced Wireless Services 3 (AWS-3) auction and is associated with the reallocation or sharing of the 1755-1780 MHz and 1695-1710 MHz bands. The SRF is administered by the Office of Management and Budget (OMB), which approves SRF transfers to federal agencies on an annual basis in consultation with the National Telecommunications and Information Administration (NTIA).

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155	0605024N	Anti-Tamper Technology Support	05	4,882				4,882	U
156	0605212M	CH-53K RDTE	05	516,955				516,955	U
157	0605212N	CH-53K RDTE	05						U
158	0605215N	Mission Planning	05	75,886				75,886	U
159	0605217N	Common Avionics	05	43,187				43,187	U
160	0605220N	Ship to Shore Connector (SSC)	05	4,909				4,909	U
161	0605327N	T-AO 205 Class	05	1,682				1,682	U
162	0605414N	Unmanned Carrier Aviation (UCA)	05	671,258				671,258	U
163	0605450M	Joint Air-to-Ground Missile (JAGM)	05	18,393				18,393	U
164	0605450N	Joint Air-to-Ground Missile (JAGM)	05						U
165	0605500N	Multi-mission Maritime Aircraft (MMA)	05	21,472				21,472	U
166	0605504N	Multi-Mission Maritime (MMA) Increment III	05	177,234				177,234	U
167	0605611M	Marine Corps Assault Vehicles System Development & Demonstration	05	77,322				77,322	U
168	0605813M	Joint Light Tactical Vehicle (JLTV) System Development & Demonstration	05	2,105				2,105	U
169	0204202N	DDG-1000	05	111,435				111,435	U
170	0303267N	Auctioned Spectrum Relocation Fund***	05						U
171	0303467N	SENSR Spectrum Pipeline SRF***	05						U
172	0304785N	Tactical Cryptologic Systems	05	101,339				101,339	U

***Funding in this Program Element was transferred during the year of execution from the Spectrum Relocation Fund (SRF) in support of the Advanced Wireless Services 3 (AWS-3) auction and is associated with the reallocation or sharing of the 1755-1780 MHz and 1695-1710 MHz bands. The SRF is administered by the Office of Management and Budget (OMB), which approves SRF transfers to federal agencies on an annual basis in consultation with the National Telecommunications and Information Administration (NTIA).

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173	0306250M	Cyber Operations Technology Development	05	2,960	6,808		6,808	U
		System Development & Demonstration		6,037,909	5,863,466	1,100	5,864,566	
174	0604256N	Threat Simulator Development	06	89,491	94,576		94,576	U
175	0604258N	Target Systems Development	06	18,737	10,981		10,981	U
176	0604759N	Major T&E Investment	06	68,977	90,514		90,514	U
177	0605126N	Joint Theater Air and Missile Defense Organization	06	140	48		48	U
178	0605152N	Studies and Analysis Support - Navy	06	4,438	3,942		3,942	U
179	0605154N	Center for Naval Analyses	06	44,302	42,693		42,693	U
180	0605285N	Next Generation Fighter	06		5,000		5,000	U
181	0605502N	Small Business Innovative Research	06	407,133				U
182	0605804N	Technical Information Services	06	1,280	1,029		1,029	U
183	0605853N	Management, Technical & International Support	06	135,102	86,932		86,932	U
184	0605856N	Strategic Technical Support	06	3,909	4,231		4,231	U
185	0605861N	RDT&E Science and Technology Management	06	1,104	1,072		1,072	U
186	0605863N	RDT&E Ship and Aircraft Support	06	105,019	97,471		97,471	U
187	0605864N	Test and Evaluation Support	06	369,056	373,834		373,834	U
188	0605865N	Operational Test and Evaluation Capability	06	20,298	21,554		21,554	U

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173	0306250M	Cyber Operations Technology Development	05	26,406				26,406	U
		System Development & Demonstration		6,332,033		1,122	1,122	6,333,155	
174	0604256N	Threat Simulator Development	06	66,678				66,678	U
175	0604258N	Target Systems Development	06	12,027				12,027	U
176	0604759N	Major T&E Investment	06	85,348				85,348	U
177	0605126N	Joint Theater Air and Missile Defense Organization	06						U
178	0605152N	Studies and Analysis Support - Navy	06	3,908				3,908	U
179	0605154N	Center for Naval Analyses	06	47,669				47,669	U
180	0605285N	Next Generation Fighter	06	20,698				20,698	U
181	0605502N	Small Business Innovative Research	06						U
182	0605804N	Technical Information Services	06	988				988	U
183	0605853N	Management, Technical & International Support	06	102,401				102,401	U
184	0605856N	Strategic Technical Support	06	3,742				3,742	U
185	0605861N	RDT&E Science and Technology Management	06						U
186	0605863N	RDT&E Ship and Aircraft Support	06	93,872				93,872	U
187	0605864N	Test and Evaluation Support	06	394,020				394,020	U
188	0605865N	Operational Test and Evaluation Capability	06	25,145				25,145	U

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Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Sec
189	0605866N	Navy Space and Electronic Warfare (SEW) Support	06	16,274	16,227		16,227	U
190	0605867N	SEW Surveillance/Reconnaissance Support	06					U
191	0605873M	Marine Corps Program Wide Support	06	21,423	21,538		21,538	U
192	0605898N	Management HQ - R&D	06	43,266	41,765		41,765	U
193	0606355N	Warfare Innovation Management	06	27,759	41,918		41,918	U
194	0606942M	Assessments and Evaluations Cyber Vulnerabilities	06		7,000		7,000	U
195	0606942N	Assessments and Evaluations Cyber Vulnerabilities	06		48,800		48,800	U
196	0305327N	Insider Threat	06		1,682		1,682	U
197	0902498N	Management Headquarters (Departmental Support Activities)	06	1,749	1,579		1,579	U
198	0909999N	Financing for Cancelled Account Adjustments	06	71				U
199	1206867N	SEW Surveillance/Reconnaissance Support	06	9,408	8,684		8,684	U
		Management Support		1,388,936	1,023,070		1,023,070	
201	0604014N	F/A -18 Infrared Search and Track (IRST)	07	68,087				U
202	0604227N	HARPOON Modifications	07		5,197		5,197	U
203	0604840M	F-35 C2D2	07		234,107		234,107	U
204	0604840N	F-35 C2D2	07		227,998		227,998	U

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189	0605866N	Navy Space and Electronic Warfare (SEW) Support	06	15,773				15,773	U
190	0605867N	SEW Surveillance/Reconnaissance Support	06	8,402				8,402	U
191	0605873M	Marine Corps Program Wide Support	06	37,265				37,265	U
192	0605898N	Management HQ - R&D	06	39,673				39,673	U
193	0606355N	Warfare Innovation Management	06	28,750				28,750	U
194	0606942M	Assessments and Evaluations Cyber Vulnerabilities	06						U
195	0606942N	Assessments and Evaluations Cyber Vulnerabilities	06						U
196	0305327N	Insider Threat	06	2,645				2,645	U
197	0902498N	Management Headquarters (Departmental Support Activities)	06	1,460				1,460	U
198	0909999N	Financing for Cancelled Account Adjustments	06						U
199	1206867N	SEW Surveillance/Reconnaissance Support	06						U
		Management Support		990,464				990,464	
201	0604014N	F/A -18 Infrared Search and Track (IRST)	07						U
202	0604227N	HARPOON Modifications	07	2,302				2,302	U
203	0604840M	F-35 C2D2	07	422,881				422,881	U
204	0604840N	F-35 C2D2	07	383,741				383,741	U

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205	0607658N	Cooperative Engagement Capability (CEC)	07	88,088	128,815		128,815	U
206	0607700N	Deployable Joint Command and Control	07	3,093	3,127		3,127	U
207	0101221N	Strategic Sub & Weapons System Support	07	130,652	148,379		148,379	U
208	0101224N	SSBN Security Technology Program	07	35,105	41,959		41,959	U
209	0101226N	Submarine Acoustic Warfare Development	07	9,439	11,311		11,311	U
210	0101402N	Navy Strategic Communications	07	17,624	38,661		38,661	U
211	0204136N	F/A-18 Squadrons	07	133,544	204,886		204,886	U
212	0204163N	Fleet Telecommunications (Tactical)	07	8,465	1,344		1,344	U
213	0204228N	Surface Support	07	20,587	9,708		9,708	U
214	0204229N	Tomahawk and Tomahawk Mission Planning Center (TMPC)	07	100,011	252,395		252,395	U
215	0204311N	Integrated Surveillance System	07	55,164	71,959		71,959	U
216	0204313N	Ship-Towed Array Surveillance Systems	07		15,454		15,454	U
217	0204413N	Amphibious Tactical Support Units (Displacement Craft)	07	2,346	6,073		6,073	U
218	0204460M	Ground/Air Task Oriented Radar (G/ATOR)	07	53,605	44,579		44,579	U
219	0204571N	Consolidated Training Systems Development	07	64,585	104,903		104,903	U
220	0204574N	Cryptologic Direct Support	07	2,355	4,544		4,544	U

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205	0607658N	Cooperative Engagement Capability (CEC)	07	127,924				127,924	U
206	0607700N	Deployable Joint Command and Control	07						U
207	0101221N	Strategic Sub & Weapons System Support	07	157,676				157,676	U
208	0101224N	SSBN Security Technology Program	07	43,354				43,354	U
209	0101226N	Submarine Acoustic Warfare Development	07	6,815				6,815	U
210	0101402N	Navy Strategic Communications	07	31,174				31,174	U
211	0204136N	F/A-18 Squadrons	07	213,715				213,715	U
212	0204163N	Fleet Telecommunications (Tactical)	07						U
213	0204228N	Surface Support	07	36,389				36,389	U
214	0204229N	Tomahawk and Tomahawk Mission Planning Center (TMPC)	07	320,134				320,134	U
215	0204311N	Integrated Surveillance System	07	88,382				88,382	U
216	0204313N	Ship-Towed Array Surveillance Systems	07	14,449				14,449	U
217	0204413N	Amphibious Tactical Support Units (Displacement Craft)	07	6,931				6,931	U
218	0204460M	Ground/Air Task Oriented Radar (G/ATOR)	07	23,891				23,891	U
219	0204571N	Consolidated Training Systems Development	07	129,873				129,873	U
220	0204574N	Cryptologic Direct Support	07						U

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221	0204575N	Electronic Warfare (EW) Readiness Support	07	49,094	66,889		66,889	U
222	0205601N	HARM Improvement	07	70,415	120,762		120,762	U
223	0205604N	Tactical Data Links	07	75,523	88,979		88,979	U
224	0205620N	Surface ASW Combat System Integration	07	28,410	26,321		26,321	U
225	0205632N	MK-48 ADCAP	07	48,740	68,255		68,255	U
226	0205633N	Aviation Improvements	07	120,940	134,823		134,823	U
227	0205675N	Operational Nuclear Power Systems	07	127,445	117,028		117,028	U
228	0206313M	Marine Corps Communications Systems	07	170,529	172,683	16,130	188,813	U
229	0206335M	Common Aviation Command and Control System (CAC2S)	07	6,976	4,760		4,760	U
230	0206623M	Marine Corps Ground Combat/ Supporting Arms Systems	07	68,941	100,850		100,850	U
231	0206624M	Marine Corps Combat Services Support	07	24,915	29,905		29,905	U
232	0206625M	USMC Intelligence/Electronic Warfare Systems (MIP)	07	30,630	37,821		37,821	U
233	0206629M	Amphibious Assault Vehicle	07	53,404	20,690		20,690	U
234	0207161N	Tactical AIM Missiles	07	34,063	40,121		40,121	U
235	0207163N	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	29,486	28,235		28,235	U
239	0303109N	Satellite Communications (SPACE)	07					U
240	0303138N	Consolidated Afloat Network Enterprise Services (CANES)	07	24,197	23,697		23,697	U

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221	0204575N	Electronic Warfare (EW) Readiness Support	07	82,325				82,325	U
222	0205601N	HARM Improvement	07	138,431				138,431	U
223	0205604N	Tactical Data Links	07						U
224	0205620N	Surface ASW Combat System Integration	07	29,572				29,572	U
225	0205632N	MK-48 ADCAP	07	85,973				85,973	U
226	0205633N	Aviation Improvements	07	125,461				125,461	U
227	0205675N	Operational Nuclear Power Systems	07	106,192				106,192	U
228	0206313M	Marine Corps Communications Systems	07	143,317		15,000	15,000	158,317	U
229	0206335M	Common Aviation Command and Control System (CAC2S)	07	4,489				4,489	U
230	0206623M	Marine Corps Ground Combat/ Supporting Arms Systems	07	51,788				51,788	U
231	0206624M	Marine Corps Combat Services Support	07	37,761				37,761	U
232	0206625M	USMC Intelligence/Electronic Warfare Systems (MIP)	07	21,458				21,458	U
233	0206629M	Amphibious Assault Vehicle	07	5,476				5,476	U
234	0207161N	Tactical AIM Missiles	07	19,488				19,488	U
235	0207163N	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	39,029				39,029	U
239	0303109N	Satellite Communications (SPACE)	07	34,344				34,344	U
240	0303138N	Consolidated Afloat Network Enterprise Services (CANES)	07	22,873				22,873	U

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241	0303140N	Information Systems Security Program	07	49,310	44,228		44,228	U
243	0305192N	Military Intelligence Program (MIP) Activities	07	6,934	6,081		6,081	U
244	0305204N	Tactical Unmanned Aerial Vehicles	07	7,770	8,529		8,529	U
245	0305205N	UAS Integration and Interoperability	07	20,848	24,663		24,663	U
246	0305208M	Distributed Common Ground/Surface Systems	07	13,338	7,610		7,610	U
247	0305208N	Distributed Common Ground/Surface Systems	07	40,150	42,846		42,846	U
248	0305220N	MQ-4C Triton	07	94,115	14,395		14,395	U
249	0305231N	MQ-8 UAV	07	62,656	24,143		24,143	U
250	0305232M	RQ-11 UAV	07	2,002	524		524	U
251	0305234N	Small (Level 0) Tactical UAS (STUASL0)	07	4,827	5,265		5,265	U
252	0305239M	RQ-21A	07	10,500	6,000		6,000	U
253	0305241N	Multi-Intelligence Sensor Development	07	93,020	81,231		81,231	U
254	0305242M	Unmanned Aerial Systems (UAS) Payloads (MIP)	07	18,392	5,956		5,956	U
255	0305421N	RQ-4 Modernization	07	224,249	219,403		219,403	U
256	0308601N	Modeling and Simulation Support	07	5,038	7,097		7,097	U
257	0702207N	Depot Maintenance (Non-IF)	07	35,463	46,560		46,560	U
258	0708730N	Maritime Technology (MARITECH)	07	4,621	27,284		27,284	U

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241	0303140N	Information Systems Security Program	07	41,853				41,853	U
243	0305192N	Military Intelligence Program (MIP) Activities	07	8,913				8,913	U
244	0305204N	Tactical Unmanned Aerial Vehicles	07	9,451				9,451	U
245	0305205N	UAS Integration and Interoperability	07	42,315				42,315	U
246	0305208M	Distributed Common Ground/Surface Systems	07	22,042				22,042	U
247	0305208N	Distributed Common Ground/Surface Systems	07						U
248	0305220N	MQ-4C Triton	07	11,784				11,784	U
249	0305231N	MQ-8 UAV	07	29,618				29,618	U
250	0305232M	RQ-11 UAV	07	509				509	U
251	0305234N	Small (Level 0) Tactical UAS (STUASL0)	07	11,545				11,545	U
252	0305239M	RQ-21A	07	10,914				10,914	U
253	0305241N	Multi-Intelligence Sensor Development	07	70,612				70,612	U
254	0305242M	Unmanned Aerial Systems (UAS) Payloads (MIP)	07	3,704				3,704	U
255	0305421N	RQ-4 Modernization	07	202,346				202,346	U
256	0308601N	Modeling and Simulation Support	07	7,119				7,119	U
257	0702207N	Depot Maintenance (Non-IF)	07	38,182				38,182	U
258	0708730N	Maritime Technology (MARITECH)	07	6,779				6,779	U

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259	1203109N	Satellite Communications (SPACE)	07	40,330	34,174		34,174	U
9999	9999999999	Classified Programs		1,857,702	1,670,503	117,282	1,787,785	U
		Operational Systems Development		4,347,723	4,913,710	133,412	5,047,122	
Total Research, Development, Test & Eval, Navy				18,465,332	18,490,002	167,812	18,657,814	

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259	1203109N	Satellite Communications (SPACE)	07	15,868				15,868	U
9999	9999999999	Classified Programs		1,613,137		108,282	108,282	1,721,419	U
		Operational Systems Development		5,104,299		123,282	123,282	5,227,581	
Total Research, Development, Test & Eval, Navy				20,270,499		164,410	164,410	20,434,909	

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14	02	0602782N	Mine & Exp Warfare Applied Res	Volume 1 - 225
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21	03	0603673N	(U)Future Naval Capabilities Advanced Tech Dev	Volume 1 - 309
22	03	0603680N	(U)Manufacturing Technology Program	Volume 1 - 325
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JT Precision Approach & Ldg Sys	0603860N	71	04	Volume 2 - 991
JT Service EOD	0604654N	139	05	Volume 3 - 1159
JT Service Explosive Ordn Dev	0603654N	57	04	Volume 2 - 735
JT Strike Fighter (JSF) - EMD	0604800N	150	05	Volume 3 - 1459
JT Tact Radio Sys (JTRS)	0604280N	117	05	Volume 3 - 533
Joint Air-to-ground Missile (JAGM)	0605450M	163	05	Volume 3 - 1867
Joint Air-to-ground Missile (JAGM)	0605450N	164	05	Volume 3 - 1883
Joint Non-Lethal Weapons Testing	0603851M	70	04	Volume 2 - 979
Joint Standoff Weapon Systems	0604727N	142	05	Volume 3 - 1191
LPD-17 Class Systems Integration	0604311N	120	05	Volume 3 - 683
Land Attack Tech	0603795N	69	04	Volume 2 - 955
Lightweight Torpedo Development	0604610N	138	05	Volume 3 - 1133
MC Advanced Technology Demo	0603640M	19	03	Volume 1 - 273
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MK-48 ADCAP	0205632N	225	07	Volume 5 - 539
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Marine Corps Grnd Cmbt/Supt Sys	0603635M	56	04	Volume 2 - 709
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Navy Strategic Comms	0101402N	210	07	Volume 5 - 145
Navy Tactical Computer Resources	0604574N	135	05	Volume 3 - 1095
Navy Warfighting Exp & Demo	0603758N	25	03	Volume 1 - 345
New Design SSN	0604558N	132	05	Volume 3 - 991
Next Generation Jammer (NGJ)	0604274N	116	05	Volume 3 - 519
Ocean Engineering Tech Dev	0603713N	58	04	Volume 2 - 781
Ocean Wrfghtg Env Applied Res	0602435N	10	02	Volume 1 - 173
Operational Test & Eval Capability	0605865N	188	06	Volume 4 - 215
Other Helicopter Development	0604212N	97	05	Volume 3 - 25
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Surface Support	0204228N	213	07	Volume 5 - 229
Tactical Aim Missiles	0207161N	234	07	Volume 5 - 1067
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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0604227N *I Harpoon Modifications*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	5.197	2.302	-	2.302	0.600	0.000	0.000	0.000	0.000	8.099
1843: *Harpoon Block II+*	0.000	0.000	5.197	2.302	-	2.302	0.600	0.000	0.000	0.000	0.000	8.099

A. Mission Description and Budget Item Justification

The Harpoon seeker upgrade program will modernize current seekers, designated 3700-3, to increase the targeting precision, reliability, and survivability. The program is the result of a successful Small Business Initiative, which will upgrade legacy 3700-3 to 3700-4+ seekers. The 3700-series seekers were designed to sequentially search, detect, acquire, and track a surface target in the designated Area of Uncertainty. The modified 3700-4+ seekers provide improvements in the sequential search radar probability of acquiring the intended target, and provide improved Electronic Protection which significantly increases the probability of engaging a valid surface target in a complex environment. These attributes of the 3700-4+ seekers will ultimately increase survivability and lethality of the Harpoon missile weapons system, and are intended to support the procurement of the Harpoon Block II+ missiles.

The Encapsulated (ENCAP) Harpoon Block IC (HIC) missiles provides Navy Los Angeles-class nuclear attack submarines (SSN) a sub-launched, all-weather, long-range Anti-Surface Warfare (ASuW) missile to attack enemy warships at stand-off ranges, to include Surface and Amphibious Action Groups. The ENCAP Reconstitution Program will refurbish and recertify 60 existing ENCAP HIC all-up rounds from deep storage to an "as-new" war-ready material condition (ENCAP Harpoons were placed in deep storage in 1996). The controlled storage conditions achieved by the missile capsule have preserved the material condition of the weapon system, allowing for relatively quick recertification and reissue. Due to the ease and speed of missile recertification's the ENCAP HIC Reconstitution Program will fill a critical, time sensitive ASuW capability gap and meet Speed to the Fleet requirements.

This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	0.000	5.426	4.557	-	4.557
Current President's Budget	0.000	5.197	2.302	-	2.302
Total Adjustments	0.000	-0.229	-2.255	-	-2.255
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-0.229			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-2.255	-	-2.255

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0604227N *I Harpoon Modifications*			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Change Summary Explanation

The FY 2020 funding for Harpoon seeker was removed as the Navy has decided not to pursue this effort.
The FY 2020 funding request provided $2.3M to fund the Encapsulated (ENCAP) Harpoon Block IC Reconstitution Program.

Technical: Not applicable.
Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604227N / *Harpoon Modifications*	Project (Number/Name) 1843 / *Harpoon Block II+*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1843: *Harpoon Block II+*	0.000	0.000	5.197	2.302	-	2.302	0.600	0.000	0.000	0.000	0.000	8.099
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Harpoon Block II+ (HII+) retrofit kit procurement provides the Department of Navy (DoN) with an enhanced tactically navigation and targeting selectivity capabilities over the legacy Harpoon Block IC (HIC) inventory. Harpoon Block II+ is a Network Enabled, Air-Launched, Anti-ship Cruise missile with the ability to receive in-flight targeting updates, improving target selectivity and the engagement of moving maritime targets. Additionally, the system utilizes the Global Positioning System to provide in-flight updates coupled with an active radar seeker for accurate targeting. The program procurement budget keeps pace with evolving enemy threats by providing a network enabled, anti-ship cruise missile capability, which compliments the attributes of associated launch platforms. The survivability of the HII+ is increased over the HIC due to the upgrade retrofit kit, increasing the lethality of the weapon system. The DoN's planned procurement modifies legacy HIC with the retrofit kits, to include procurement of Captive Air Training Missiles (CATMs), increasing the Anti-Surface Warfare capabilities of Fleet Forces.

The Harpoon seeker upgrade program will modernize current seekers, designated 3700-3, to increase the targeting precision, reliability, and survivability. The program is the result of a successful Small Business Initiative, which will upgrade legacy 3700-7 to 3700-4+ seekers. The 3700-series seekers were designed to sequentially search, detect, acquire, and track a surface target in the designated Area of Uncertainty. The modified 3700-4+ seekers provide improvements in the sequential search radar probability of acquiring the intended target, and provide improved Electronic Protection which significantly increases the probability of engaging a valid surface target in a complex environment. These attributes of the 3700-4+ seekers will ultimately increase survivability and lethality of the Harpoon missile weapons system, and are intended to support the procurement of the Harpoon Block II+ missiles.

The Encapsulated (ENCAP) Harpoon Block IC (HIC) missiles provides Navy Los Angeles-class nuclear attack submarines (SSN) a sub-launched, all-weather, long-range Anti-Surface Warfare (ASuW) missile to attack enemy warships at stand-off ranges, to include Surface and Amphibious Action Groups. The ENCAP Reconstitution Program will refurbish and recertify 60 existing ENCAP HIC all-up rounds from deep storage to an "as-new" war-ready material condition (ENCAP Harpoons were placed in deep storage in 1996). The controlled storage conditions achieved by the missile capsule have preserved the material condition of the weapon system, allowing for relatively quick recertification and reissue. Due the ease and speed of missile recertifications the ENCAP HIC Reconstitution Program will fill a critical, time sensitive ASuW capability gap and meet Speed to the Fleet requirements.

This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Operational System Development	0.000	5.197	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604227N / *Harpoon Modifications*	**Project (Number/Name)** 1843 / *Harpoon Block II+*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: New Start will begin in FY 2019 and provide funding for manufacturing, prototype and testing. FY 2019 plan is to develop a new manufacturing process to upgrade legacy 3700-3 seekers to 3700-4+ seekers. These efforts for the 3700-4+ seekers include factory acceptance tests, design verification tests, environmental tests and operational flight testing. The endstate is a production-ready seeker design. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding for Harpoon seeker was removed as the Navy has decided not to pursue this effort.					
Title: ENCAP Reconstitution Program	0.000	0.000	2.302	0.000	2.302
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** The ENCAP Reconstitution Program requires Navy to develop, test, validate, and certify submarine software changes; re-develop, test, and requalify submarine crew training systems, materials, and documentation; and transport, disassemble, inspect, repair, refurbish, modify, recertify, reassemble, re-inspect, and reissue ENCAP AUR capsules and Harpoon missile bodies (HMBs) between government storage sites and Contractor facilities.The ENCAP Reconstitution Program will require a collective, cooperative NAVAIR and NAVSEA effort to re-integrate ENCAP AURs and capability back into USN LA-class nuclear-powered attack submarines. Navy efforts within NAVSEA and NAVAIR may include: refurbishing, preparing, and test firing several Encapsulated Harpoon Certification and Training Vehicles (EHCVTs) at-sea from several LA-class SSNs; Shock and Implosion safety studies and analysis with supporting tests, reports, and engineering document; and Navy lab and contracted independent validation and verification (IV&V) efforts of developed and installed software algorithms in the BYG-1 submarine combat system and supporting submarine trainers. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604227N / *Harpoon Modifications*	**Project (Number/Name)** 1843 / *Harpoon Block II+*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Fund Harpoon Reconstitution to SSNs					
Accomplishments/Planned Programs Subtotals	0.000	5.197	2.302	0.000	2.302

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 1507N/2326: *Harpoon Mods*	15.300	26.840	25.447	-	25.447	29.379	8.229	7.523	7.600	0.000	120.318
• 1810N/5227: *Harpoon Support Equipment*	0.000	0.000	1.100	-	1.100	0.100	0.100	0.100	0.100	0.000	1.500

Remarks

D. Acquisition Strategy

The new digital technology of the 3700-4+ seeker enables improved functionality, reliability, and survivability in a reduced footprint, and allows for the inclusion of a new interface which permits for future capability improvements for the Harpoon weapon system. The legacy Harpoon 3700-3 seekers will be upgraded using a unique process developed by L-3/Mustang to the 3700-4+ seeker. The upgrade will build upon achievements gained via SBIR N102-131 (Phases I and II) to develop the new seeker manufacturing process to convert old analog 3700-3 seekers to new 3700-4+ digital seekers. Developmental engineering and production assets will be procured by a sole source Cost-Plus Incentive Fee contract. Non-recurring engineering and production options will be priced separately.

The Encapsulated Harpoon Block IC (ENCAP HIC) Reconstitution Program will refurbish and recertify 60 existing ENCAP HICs to an as-new war-ready material condition. Coordinated contracting efforts between NAVAIR and NAVSEA offices will reintegrate and supply ENCAP HICs. Vendor support for all associated activates will leverage existing vendor relationships, and exiting contracts when able. All required manufacturing processes, support facilities, and tooling currently exist and are in current use for this program.

E. Performance Metrics

The performance of the 3700-4+ seeker program will be managed through program reviews with the vendor, in conjunction with associated Government Support activities. The schedule of reviews will be established in FY 2020 with contract award.

Encapsulated Harpoon Block 1C reconstitution efforts will be evaluated by incorporating required reporting into the existing Program Management Review schedule and process already established with the vendor for current R/A/UGM-84 work. Current formal program reviews will occur quarterly.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604227N / *Harpoon Modifications*	**Project (Number/Name)** 1843 / *Harpoon Block II+*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	SS/CPIF	Mustang/L3 : Plano, TX	0.000	0.000		4.968	Feb 2019	0.000		-		0.000	0.000	4.968	4.968
Missile Support- Encap	C/CPFF	BSC : Chantilly, VA	0.000	0.000		0.000		0.302	Dec 2019	-		0.302	0.200	0.502	0.502
		Subtotal	0.000	0.000		4.968		0.302		-		0.302	0.200	5.470	N/A

Remarks

BSC: Performing Independent Verification and Validation for Harpoon HIC ENCAP efforts for BYG-1 software modifications for required system safety reviews and requirements.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Support	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.229	Nov 2018	0.000		-		0.000	0.000	0.229	-
		Subtotal	0.000	0.000		0.229		0.000		-		0.000	0.000	0.229	N/A

Remarks

FY 2020 Support costs consist of government in-house program management, technical management, and other support. These government support costs cover the efforts to develop, test, validate, and certify submarine software changes as well as requalify submarine crew training systems, materials, and documentation.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
T&E - Encap	WR	NUWC Naval Undersea Warfare Center : Newport, RI	0.000	0.000		0.000		1.600	Nov 2019	-		1.600	0.300	1.900	-
T&E - Encap	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.100	Nov 2019	-		0.100	0.050	0.150	-
T&E - Encap	WR	COMOPTEVFOR : Virginia	0.000	0.000		0.000		0.300	Nov 2019	-		0.300	0.050	0.350	-
		Subtotal	0.000	0.000		0.000		2.000		-		2.000	0.400	2.400	N/A

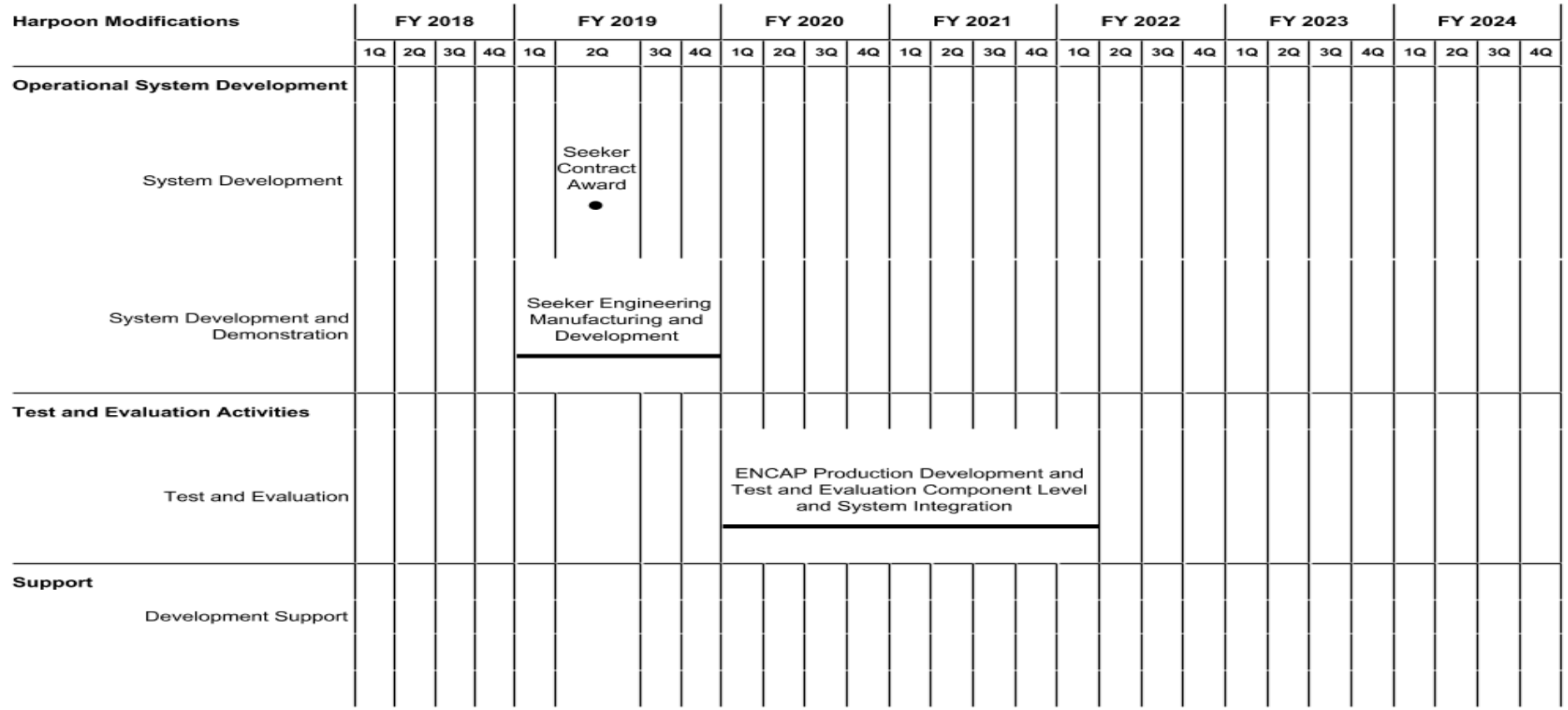
Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604227N / *Harpoon Modifications*	Project (Number/Name) 1843 / *Harpoon Block II+*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks Test and Evaluation cost for the Harpoon HIC ENCAP reconstitution efforts include system safety analysis and reporting, verification testing of refurbished training systems, required sea trial activities with analysis and reporting, safety/shock/implosion analysis, and analysis reporting.															
Project Cost Totals			0.000	0.000		5.197		2.302		-		2.302	0.600	8.099	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604227N / *Harpoon Modifications*	**Project (Number/Name)** 1843 / *Harpoon Block II+*



2020PB - 0604227N - 1843

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604227N / *Harpoon Modifications*	**Project (Number/Name)** 1843 / *Harpoon Block II+*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Harpoon Modifications				
Operational System Development: System Development: Seeker Contract Award	2	2019	2	2019
Operational System Development: System Development and Demonstration: Seeker Engineering Manufacturing and Development	1	2019	4	2019
Test and Evaluation Activities: Test and Evaluation: ENCAP Production Development and Test and Evaluation Component Level and System Integration	1	2020	1	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0604840M *I (U)F-35B C2D2*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	234.107	422.881	-	422.881	373.365	313.601	283.357	270.845	Continuing	Continuing
3410: *F-35B C2D2*	0.000	0.000	234.107	422.881	-	422.881	373.365	313.601	283.357	270.845	Continuing	Continuing

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 198

A. Mission Description and Budget Item Justification

The F-35 Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike aircraft for the United States Navy, United States Air Force, United States Marine Corps and International Partners countries. There are three variants the F-35A Conventional Takeoff and Landing variant; F-35B Short Take Off and Vertical Landing; and the F-35C Aircraft Carrier suitable variant. Maximum commonality among the variants, consistent with National Disclosure Policy, will minimize total air system life cycle costs. Planning and pre-development systems engineering for Block 4 continues as Initial Operational Capability (IOC) is met for each variant during System Development and Demonstration (SDD).

The JSF Continuous Capability Development & Delivery(C2D2) efforts provide incremental warfighting capability improvements to maintain joint air dominance against evolving threats. Block 4 capability requirements were initiated through ongoing Service-led operational analysis of warfighting gaps identified in the Fifth Generation Fighter Modernization Initial Capabilities Document (ICD), and through F-35 JSF Block 4 Mission Decomposition analysis completed in FY2014. These analyses serve as the basis for the Block 4 (CDD), staffed through the Air Force Requirements Oversight Council (AFROC) and signed by the USAF Chief of Staff in January 2015. Joint Requirements Oversight Council (JROC) approved the CDD 21 March 2017. Modernization activities in FY2017 and FY2018 include systems engineering, risk reduction, and infrastructure required to deliver full air system Block 4 capabilities to support initial fleet availability of Block 4 upgrades in FY2021.

Block 4 efforts designated as Block 4 include a robust weapons integration portfolio and provide new opportunities for International Partners to assess, integrate, and field unique capabilities based on global sovereign requirements.

The United Kingdom, Italy, Netherlands, Turkey, Canada, Australia, Denmark and Norway are participants in F-35 modernization. The program shown here reflects United States Marine Corps funding. Total funding for all Service and International Partners is reported at the accomplishment/planned program level since activities support all aircraft variants. Foreign Military Sales are ongoing separately.

PE 0604840M/N replacing PE 0604810M/N beginning in FY19 due to budget being moved from BA05 to BA07.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0604840M *I (U)F-35B C2D2*			
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	0.000	259.122	228.719	-	228.719
Current President's Budget	0.000	234.107	422.881	-	422.881
Total Adjustments	0.000	-25.015	194.162	-	194.162
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-25.015			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	158.566	-	158.566
• Rate/Misc Adjustments	0.000	0.000	35.596	-	35.596

Change Summary Explanation

The FY2020 USMC funding request was increased by $194.162 million to fund to fully fund to the cost estimate.

PE 0604840M/N replacing PE 0604810M/N beginning in FY19 due to budget being moved from BA05 to BA07.

Adjusted R-4 schedule as follows:
Updated previous milestones to reflect current F-35 Lightning II Joint Strike Fighter Acquisition Strategy, approved by USD(A&S)October 2018.

Technical: Not applicable.
Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604840M / *(U)F-35B C2D2*	Project (Number/Name) 3410 / *F-35B C2D2*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3410: *F-35B C2D2*	0.000	0.000	234.107	422.881	-	422.881	373.365	313.601	283.357	270.845	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 198

Note

Total cost, including International partner contributions, USN, USMC, and USAF funding: FY2020: $1,782.964M.

R-2A table shown above reflects service funding only.

R-2A (section B)/R-3 displays combined program for JSF Continuous Capability Development and Delivery (C2D2).

JSF C2D2 Includes:
USAF PE 0207142F BPAC 675346
USN PE 0604840N/ Project Unit 2936
USMC PE 0604840M Project Unit 3410
USN PE 0604810N/ Project Unit 2936
USMC PE 0604810M Project Unit 2935
USN PE 0604800N Project Unit 9999 (FY14): $1.500M
USMC PE 0604800M Project Unit 9999 (FY14): $1.500M
International Partner Contributions

A. Mission Description and Budget Item Justification

F-35 C2D2 provides continuing incremental upgrades of the three F-35 variants and associated ground equipment. Upgrades are essential capabilities for Air Interdiction and Strategic Attack, Close Air Support, Suppression and Destruction of Enemy Air Defenses, Offensive and Defensive Counter Air and expanded Surface Warfare. The C2D2 acquisition strategy is based upon incremental deliveries of capabilities. The strategy includes periodic deliveries with a focus on hardware, tech refresh and softwre. C2D2 capability planning includes an efficient transition from F-35 SDD to C2D2. As SDD development activities ramp down C2D2 will assume responsibility for improvements and modernization efforts.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development - Block 4 Planning and Systems Engineering	0.000	213.559	622.265	0.000	622.265
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Block 4 Planning and Systems Engineering preliminarily design and delta System requirements Review (SRR) for all variants of the F-35 Aircraft. Modernization efforts is the Requirements Decomposition of capabilities for the Block 4 upgrade to include sub-blocks. This is a continuation of the previous Block 4 Requirements Decomposition effort which will include activities leading up to a successful System Functional Review (SFR) and select facility upgrades required for Block 4 research, development, test and evaluation. Included in Block 4 are upgraded capabilities and continuous improvements to maintain Air System viability against evolving threats indicated in the Electronic Warfare Initial Capabilities Document (ICD), the Fifth Generation Fighter Modernization ICD, and the Block 4 Capability Development Document (CDD), reduce life cycle cost, and improve operational suitability. Expected completion of Block 4 System Requirements Review (SRR) and a Preliminary Design Review (PDR) will address additional Block 4 capabilities requirements. Continuous risk reduction, preplanning for subsequent Block 4 Modernization events, and investments to deliver the full Block 4 Air System capabilities are included. ***FY 2019 Plans:*** Continued from PE 0604810M/N. Continue Block 4 Phase II contract development. Conduct Block SRR and PDR activities as well as continuing risk reduction and planning. Continuing development and maturity of key long lead capabilities and service unique weapons. Begin Developmental Flight Test of initial Block 4 capabilities. ***FY 2020 Base Plans:*** Continue Block 4 contract development. Continue Post-PDR risk reduction activities to include completion of Developmental Flight Test. Continue with Agile development of capabilities through Developmental Flight Test. Continue development and maturity of key long lead capabilities and service unique weapons. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as Block 4 capabilities and development efforts ramp up.					
Title: Product Development - Technology Refresh 3 (TR-3) ***Articles:*** ***Description:*** Technology Refresh 3 (TR-3) Design Competition, Development, Integration, and Test. This is the design phase of TR-3 program fully supports Block 3F functionality and allows incorporation of all Block 4	0.000 -	98.000 -	195.600 -	0.000 -	195.600 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
capabilities documented in the System Requirements Document (SRD). TR-3 hardware redesign is required to support 4X processing growth factor based on the current processing estimates for all 3F capabilities. Redesign of TR-3 subsystems Integrated Core Processor (ICP), Aircraft Memory System (AMS), and Panoramic Cockpit Display (PCD)) configurations will contain new backplane technology, commercial operating systems, and modified middleware necessary to take the design of the TR-3 System through Critical Design Review (CDR). ***FY 2019 Plans:*** Continued from PE 0604810M/N. The TR-3 program will continue design toward Critical Design Review of the Integrated Core Processor (ICP), Panoramic Cockpit Display (PCD), and Aircraft Memory System (AMS). In addition the TR-3 program will prototype the middleware software that will enable F-35's new messaging architecture delivered as part of TR-3 and ensure compatibility with current F-35 sensors. Additionally the initial lab stand up will occur to ensure timely first article delivery to the production line in FY23. ***FY 2020 Base Plans:*** The TR-3 program will complete design for Critical Design Review of the Integrated Core Processor (ICP), Panoramic Cockpit Display (PCD), and Aircraft Memory System (AMS). In addition the TR-3 program will continue with the development of middleware software to ensure and validate compatibility with current F-35 sensors and weapon loads. Continued lab test and verification will ensure timely first article delivery to the production line by FY23. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as Block 4 capabilities and development efforts ramp up.					
Title: Infrastructure and Support Costs	0.000	185.163	205.811	0.000	205.811
Articles:	-	-	-	-	-
Description: Funding will support infrastructure investment planning and other test planning activities required for Block 4 development, integration, test and evaluation. Funding related to the Integrated Test Force, government, and contractor labor. Support efforts for airframe, air vehicle systems, mission systems, weapons integration, mission support, autonomic logistics development, joint reprogramming enterprise, modeling and					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
simulation environment activities and training investment support. Other costs in support of ranges, chase planes and DT site operations. ***FY 2019 Plans:*** Continued from PE 0604810M/N. Continue development support for defining, managing and acquiring the F-35 capability enhancements identified in approved requirements documents. Transfer of integrated test force requirement to Block 4 as F-35 SDD draws to closure. USAF only will fund additional PMA to transition to a final hybrid product support integrator (HPSI) which will support sustainment analysis with product support managers, focused on long term strategic planning and transition to a final integrated support plan. Conduct strategic basing analysis to determine permanent location for core of HPSI. ***FY 2020 Base Plans:*** Continue development support for defining, managing and acquiring the F-35 capability enhancements identified in approved requirements documents. Transfer of integrated test force requirement to Block 4 as F-35 SDD draws to closure. USAF only will fund additional PMA to transition to a final hybrid product support integrator (HPSI) which will support sustainment analysis with product support managers, focused on long term strategic planning and transition to a final integrated support plan. Conduct strategic basing analysis to determine permanent location for core of HPSI. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as Block 4 capabilities and development efforts ramp up.					
Title: Test and Evaluation ***Articles:*** ***Description:*** Developmental Test activities in support of Block 4, to include Lockheed Martin and Pratt & Whitney support at both test sites. Non-recurring engineering required to plan for the service life extension of existing DT aircraft and modification necessary to bring DT aircraft fleet to a more production representative and sustainable configuration. Additional upgrades required to support development and evaluation of improvements driven by changes in the threat environment and as identified in the Electronic Warfare ICD, the Fifth Generation Fighter Modernization ICS, and the Block 4 Capability Development Document (CDD).	0.000 -	480.714 -	601.355 -	0.000 -	601.355 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Continued from PE 0604810M/N. Funding will support flight test execution to ensure Block 4 capabilities are delivered as designed. Funding also supports investment planning and prioritization required to maintain future development capabilities. This includes instrumenting new DT aircraft, ordering the replacement of pre-LRIP aircraft engines, continuing the FY18 NRE work, and delivery and install of upgraded hardware as a part of the DT aircraft viability effort, as well as test engine support. Additionally, this funding supports laboratory upgrades required to support development and verification of capabilities in a relevant environment. ***FY 2020 Base Plans:*** Funding will support flight test execution to ensure Block 4 capabilities are delivered as designed. Funding also supports investment planning and prioritization required to maintain future development capabilities. This includes continuing work on instrumenting new DT aircraft, and delivery and install of upgraded hardware as part of the DT aircraft viability effort, as well as test engine support. Additionally, this funding supports laboratory upgrades required to support development and verification of capabilities in a relevant environment. Efforts include non-recurring engineering and procurement of a test article to evaluate service life of F-35B STOVL Aircraft. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as Block 4 capabilities and development efforts ramp up.					
Title: Autonomic Logistics Information System (ALIS) Development	0.000	120.926	157.933	0.000	157.933
Articles:	-	-	-	-	-
Description: Autonomic Logistics Information System (ALIS) continues to deliver the core logistics infrastructure requirements for the F-35 enterprise. ALIS includes features such as aircraft scheduling, training delivery and record keeping, technical data delivery, supply chain management, maintenance management, pilot and maintenance debriefing, and mission planning. The ALIS development program is focused on two primary lines of effort: Current ALIS which includes Agile DevOps, and ALIS Next. Current ALIS is focused on developing new software that uses the current software as a baseline. Upcoming software releases include 3.5, 3.6 and 3.7 builds. The required new capabilities have been defined by the					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
US Services and include cybersecurity updates, decentralized maintenance, Prognostic Health Monitoring (PHM), Training Management System upgrades, Personnel Flight Equipment (PFE), Low Observable Health Assessment System (LOHAS), Corrosion Management System, squadron resource sharing, and new propulsion capabilities. All aspects of ALIS software are included in current ALIS development. The software development will have applicability to the Standard Operating Units (SOU), Central Points of Entry (CPE), and the Autonomic Logistics Operating Unit (ALOU) for both classified and unclassified hardware. Under the umbrella of current ALIS, an Agile DevOps pilot is working to rapidly deliver capability updates to the fleet and change the way that current ALIS delivers software. ALIS Next is the re-architecture effort that began in FY19 and will complete fielding in FY23. ALIS Next will redesign ALIS software, data, and hardware architecture with a focus on cybersecurity, affordability, resiliency, and supportability. ***FY 2019 Plans:*** Continue Current ALIS software development efforts and deliver ALIS build 3.5, which contains critical software stabilization improvements. Current ALIS efforts will also continue to transition to a pure Agile DevOps development framework. ALIS Next efforts will produce a reference architecture and a detailed transition plan to the new architecture. ***FY 2020 Base Plans:*** Continue Current ALIS software development efforts as well as begin ALIS build 3.6. Increase the number of DevOps product teams and begin to merge with Current ALIS development efforts. Refactor ALIS software in accordance with the ALIS Next architecture developed in FY19. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as well as Current ALIS and ALIS Next efforts continue to ramp up.					
Accomplishments/Planned Programs Subtotals	0.000	1,098.362	1,782.964	0.000	1,782.964
USAF Continuous Capability Development and Delivery	-	426.494	694.455	-	694.455
F-35C C2D2	-	227.998	383.741	-	383.741

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
International Continuous Capability Development and Delivery	-	209.763	281.887	-	281.887
Navy Subtotals	0.000	234.107	422.881	0.000	422.881

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDT&E/0604840N/2936: *F-35C C2D2*	0.000	227.998	383.741	-	383.741	351.536	263.066	252.898	245.204	Continuing	Continuing
• USAF/FOM/0207142F: *USAF Continuous Capability Development and Delivery*	0.000	426.494	694.455	-	694.455	786.513	550.100	451.737	522.023	Continuing	Continuing
• International: *International Continuous Capability Development and Delivery*	0.000	209.763	281.887	-	281.887	339.139	224.501	189.728	158.811	Continuing	Continuing

Remarks

This is a joint program with no executive service. Service Acquisition Executive (SAE) authority alternates between the Department of the Navy and the Department of the Air Force and currently resides with the Air Force. Program Element 0604800N/0604800M continues USN development efforts budgeted in 0603800N prior to FY2002. The United Kingdom, Italy, Netherlands, Turkey, Canada, Australia, Denmark, and Norway are participants in the SDD phase of JSF.

PE 0604810M/N ending in FY18 and continues in PE 0604840M/N as budget moves from BA05 to BA07.

D. Acquisition Strategy

The C2D2 acquisition strategy is to employ both Cost and Fixed Price Incentive contracts for the Block 4 engineering and development efforts. A new modernization contract structure will be established for all post SDD Block 4 efforts. In addition, a separate Basic Ordering Agreement or Indefinite Quantity/Indefinite Delivery contract is planned to provide a long term approach to upgrading and maintaining laboratories and test aircraft and supporting technology maturation for future C2D2 capabilities.

E. Performance Metrics

Overall Block 4 Performance Metrics will reflect Key Performance Parameters established in the F-35 Block 4 Capability Development Document.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prime LM 18-C-1004 (Phase II)	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		142.759	Dec 2018	416.615	Dec 2019	-		416.615	1,031.289	1,590.663	1,309.737
Prime LM 14-G-0020 (TR3)	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		98.000	Dec 2018	195.600	Dec 2019	-		195.600	510.000	803.600	685.696
Prime LM BOA 0020 (Nimble Lightning + Pilot Training)	C/CPFF	Various : Various	0.000	0.000		4.500	Jan 2019	4.650	Jan 2020	-		4.650	17.500	26.650	22.260
Flight Test Asset	Various	Lockheed Martin : FT. Worth, TX	0.000	0.000		139.110	Jan 2019	105.000	Jan 2020	-		105.000	406.000	650.110	491.346
Prime LM DT AC Viability	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		32.750	Jan 2019	79.000	Jan 2020	-		79.000	415.000	526.750	515.100
Prime PW Propulsion	SS/CPFF	Pratt Whitney : East Hartford, Connecticut	0.000	0.000		136.000	Oct 2018	82.000	Oct 2019	-		82.000	220.000	438.000	269.450
Prime LM Developmental Foundation Contract	C/CPIF	Lockheed Martin : FT. Worth, TX	0.000	0.000		75.800	Nov 2018	201.000	Nov 2019	-		201.000	345.000	621.800	445.550
Prime TBD JRE Dev.	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		35.000	Jan 2019	85.200	Dec 2019	-		85.200	Continuing	Continuing	Continuing
Prime LM ALIS Next	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		16.411	Dec 2018	68.000	Dec 2019	-		68.000	Continuing	Continuing	Continuing
Prime LM ALIS Dev	C/CPIF	Lockheed Martin : FT. Worth, TX	0.000	0.000		50.000	Jul 2019	58.000	Dec 2019	-		58.000	0.000	108.000	-
Prime LM F-35B Fatigue Test Article	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		0.000		21.300	Jan 2020	-		21.300	0.000	21.300	-
Training Investments	C/CPIF	Lockheed Martin : FT. Worth, TX	0.000	0.000		0.000		45.000	Dec 2019	-		45.000	0.000	45.000	-
Systems Engineering	Various	Various : Various	0.000	0.000		31.300	Jan 2019	49.500	Jan 2020	-		49.500	88.000	168.800	106.423
		Subtotal	0.000	0.000		761.630		1,410.865		-		1,410.865	Continuing	Continuing	N/A

Remarks

FY2019 & FY2020 Product Development continued from PE 0604810M/N.
Combined ECASE contract line into Systems Engineering line to delete duplicative line items as ECASE contract is a vehicle used for Systems Engineering efforts.
Block 4 Modernization on R-2A includes Phase II, Nimble Lightning, JRE, Training Investments & Systems Engineering.
Flight Test assets include weapons to support Test and assests needed for flight test instrumentation.
Broke out Prime LM TBD JRE Dev line seperately from Block 4 Phase II contract line due to change in contracting strategy.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604840M / *(U)F-35B C2D2*	Project (Number/Name) 3410 / *F-35B C2D2*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Broke out Prime LM Current ALIS Dev & Prime LM ALIS Next efforts seperately from ALIS Re-architecture as directed by OSD(C). Added F-35B Fatigue Test Article and Training Investments lines in FY20.															

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JSE/IPT Development Support	WR	NAWCAD : Patuxent River, MD	0.000	0.000		32.400	Dec 2018	48.740	Dec 2019	-		48.740	Continuing	Continuing	Continuing
Development Support	WR	NAWCWD : China Lake, CA	0.000	0.000		6.275	Dec 2018	7.850	Dec 2019	-		7.850	43.083	57.208	-
Development Support	Various	Eglin : Various	0.000	0.000		3.500	Dec 2018	4.500	Dec 2019	-		4.500	15.268	23.268	-
Development Support	Various	Various : Various	0.000	0.000		22.212	Dec 2018	27.000	Dec 2019	-		27.000	34.513	83.725	-
Development Support	MIPR	AFRL : Wright Patterson AFB	0.000	0.000		3.978	Dec 2018	7.500	Dec 2019	-		7.500	13.923	25.401	-
JRE Development Support	C/BA	Various : Various	0.000	0.000		18.300	Dec 2018	25.900	Dec 2019	-		25.900	0.000	44.200	-
ALIS Development Support	Various	Various : Various	0.000	0.000		35.220	Dec 2018	16.933	Dec 2019	-		16.933	0.000	52.153	-
ALIS Next Development Support	MIPR	Various : Various	0.000	0.000		19.295	Dec 2018	15.000	Dec 2019	-		15.000	0.000	34.295	-
		Subtotal	0.000	0.000		141.180		153.423		-		153.423	Continuing	Continuing	N/A

Remarks

FY2019 & FY2020 Support continued from PE 0604810M/N.
Broke out JRE and ALIS Development Support from Block 4 Phase II contract line due to change in contracting strategy.
Broke out ALIS Next Development Support line per direction to add more detailed ALIS information.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCAD : Patuxent River, MD	0.000	0.000		54.000	Dec 2018	65.000	Dec 2019	-		65.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604840M / *(U)F-35B C2D2*	Project (Number/Name) 3410 / *F-35B C2D2*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCWD : China Lake , CA	0.000	0.000		6.500	Dec 2018	11.200	Dec 2019	-		11.200	40.470	58.170	-
Developmental Test & Evaluation Edwards/AFB	Various	Edwards AFB : Edwards AFB, CA	0.000	0.000		26.554	Dec 2018	22.455	Dec 2019	-		22.455	110.470	159.479	-
Developmental Test & Evaluation	Various	Various : Various	0.000	0.000		3.500	Dec 2018	4.200	Dec 2019	-		4.200	57.087	64.787	-
Operational Test & Evaluation	WR	Kirtland AFB, NM : Kirtland AFB, NM	0.000	0.000		6.500	Dec 2018	31.500	Dec 2019	-		31.500	72.500	110.500	-
		Subtotal	0.000	0.000		97.054		134.355		-		134.355	Continuing	Continuing	N/A

Remarks

FY2019 & FY2020 Test and Evaluation continued from PE 0604810M/N.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AFLCMC Civilian Pay	C/BA	AFLCMC CIVPAY : Wright Patterson, AFB	0.000	0.000		42.885	Oct 2018	44.172	Oct 2019	-		44.172	231.610	318.667	-
HPSI Program Sppt.	Various	AFLCMC : Wright Patterson, AFB	0.000	0.000		9.600	Oct 2018	0.000	Oct 2019	-		0.000	Continuing	Continuing	Continuing
Financial Mgmt Database Support IDS	C/BA	Various : Various	0.000	0.000		1.300	Dec 2018	1.565	Dec 2019	-		1.565	4.301	7.166	-
Earned Value/Finance/ Cost ACT-I	C/BA	Various : Various	0.000	0.000		4.079	Dec 2018	4.201	Dec 2019	-		4.201	23.518	31.798	-
Systems System High BOS	C/BA	Various : Various	0.000	0.000		8.532	Dec 2018	8.788	Dec 2019	-		8.788	45.342	62.662	-
Other CIO Services	Various	Various : Various	0.000	0.000		0.404	Dec 2018	2.127	Dec 2019	-		2.127	22.579	25.110	-
Other Core Civ Pay	WR	NAWCAD/WD : Various	0.000	0.000		21.685	Dec 2018	11.000	Dec 2019	-		11.000	0.000	32.685	-
Other Core Contractor Sppt.	WR	Various : Various	0.000	0.000		6.437	Dec 2018	8.218	Dec 2019	-		8.218	0.000	14.655	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604840M / *(U)F-35B C2D2*	Project (Number/Name) 3410 / *F-35B C2D2*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Various	Various : Various	0.000	0.000		3.576	Oct 2018	4.250	Oct 2019	-		4.250	8.569	16.395	-
		Subtotal	0.000	0.000		98.498		84.321		-		84.321	Continuing	Continuing	N/A

Remarks

Breaking out HPSI AFLCMC funding from AFLCMC Civilian Pay line for visibility.
Added Other Core Civ Pay & Other Core Contractor Sppt to account for program operations support.
Beginning in FY20 HPSI will be in a seperate BPAC and no longer included in C2D2 budget docs.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Subtotals	0.000	0.000		1,098.362		1,782.964		-		1,782.964	Continuing	Continuing	N/A
USAF Continuous Capability Development and Delivery	-	-		426.494		694.455		-		694.455			-
F-35C C2D2	-	-		227.998		383.741		-		383.741			-
International Continuous Capability Development and Delivery	-	-		209.763		281.887		-		281.887			-
Project Cost Totals	0.000	0.000		234.107		422.881		-		422.881	0.000	0.000	-

Remarks

Subtotals and totals may not add due to rounding.

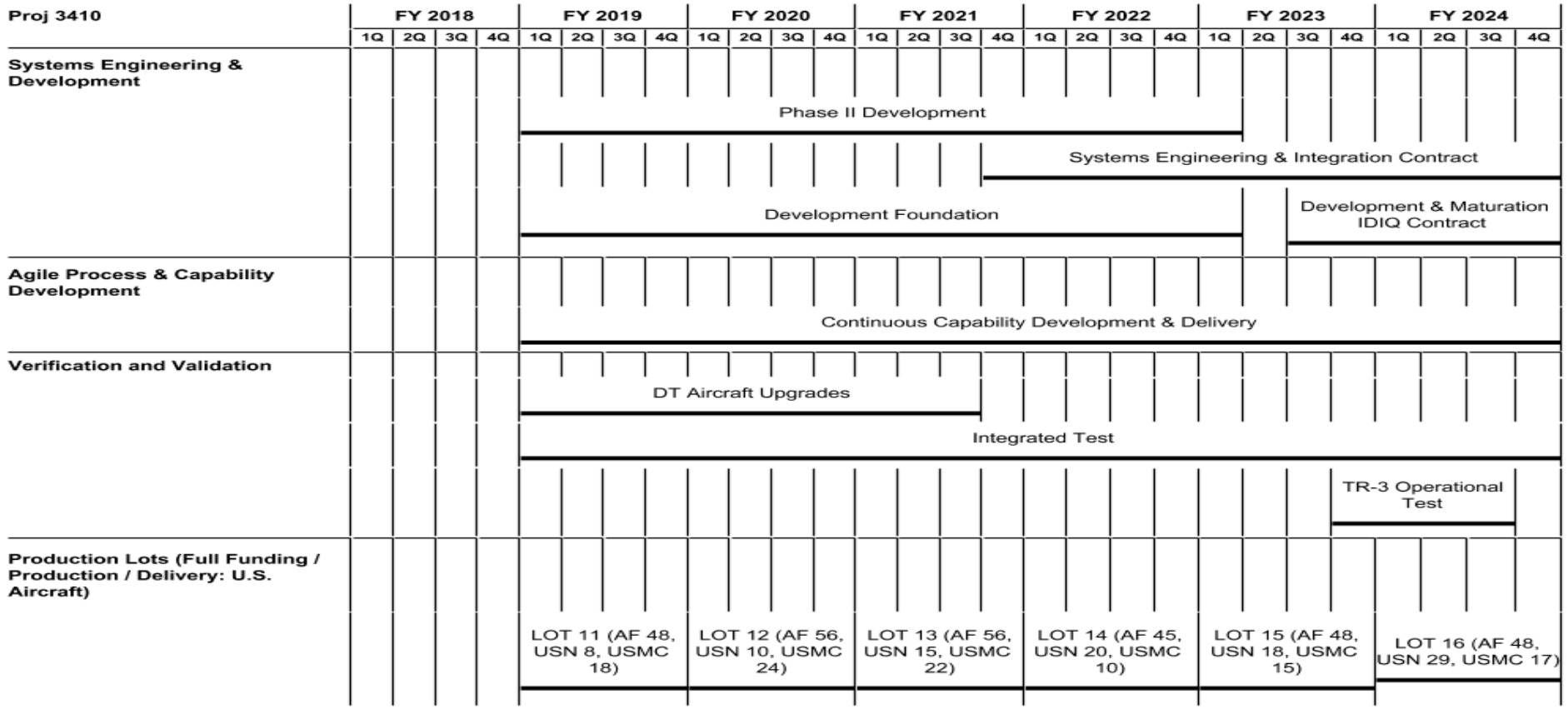
Prior Year reflects $0M due to PE 0604810M/N ending in FY18 and being replaced by PE 0604840M/N in FY19 as budget moves from BA05 to BA07.

FY 2019 reflects $426.494M USAF/$227.998M USN/$234.107M USMC/$209.763M International/Total $1,098.362M
FY 2020 reflects $694.455M USAF/$383.741M USN/$422.881M USMC/$281.887M International/Total $1,782.964M

R-2A (section B)/R-3 displays total combined program (i.e. not Service-specific), including International partners.

JSF Continuous Capability Development and Delivery (C2D2) Includes:
USAF PE 0207142F BPAC 675346
USN PE 0604810N Project Unit 2936 - ends FY18
USMC PE 0604810M Project Unit 2935 - ends FY18
USN PE 0604840N Project Unit 2936 - begins FY19
USMC PE 0604840M Project Unit 2935 - begins FY19
USN PE 0604800N Project Unit 9999 (FY14): $1.500
USMC PE 0604800M Project Unit 999 (FY14) : $1.500

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*



2020PB - 0604840M - 3410

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840M / *(U)F-35B C2D2*	**Project (Number/Name)** 3410 / *F-35B C2D2*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3410				
Systems Engineering & Development: Phase II Development	1	2019	1	2023
Systems Engineering & Development: Systems Engineering & Integration Contract	4	2021	4	2024
Systems Engineering & Development: Development Foundation	1	2019	1	2023
Systems Engineering & Development: Development & Maturation IDIQ Contract	3	2023	4	2024
Agile Process & Capability Development: Agile Process & Capability Development	1	2019	4	2024
Verification and Validation: DT Aircraft Upgrades	1	2019	3	2021
Verification and Validation: Integrated Test	1	2019	4	2024
Verification and Validation: TR-3 Operational Test	4	2023	3	2024
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 11 Full Funding / Production / Delivery	1	2019	4	2019
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 12 Full Funding / Production / Delivery	1	2020	4	2020
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 13 Full Funding / Production / Delivery	1	2021	4	2021
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Production / Delivery	1	2022	4	2022
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Production / Delivery	1	2023	4	2023
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Production / Delivery	1	2024	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0604840N *I (U)F-35C C2D2*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	227.998	383.741	-	383.741	351.536	263.066	252.898	245.204	Continuing	Continuing
2936: *F-35C C2D2*	0.000	0.000	227.998	383.741	-	383.741	351.536	263.066	252.898	245.204	Continuing	Continuing

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 198

A. Mission Description and Budget Item Justification

The F-35 Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike aircraft for the United States Navy, United States Air Force, United States Marine Corps and International Partners countries. There are three variants the F-35A Conventional Takeoff and Landing variant; F-35B Short Take Off and Vertical Landing; and the F-35C Aircraft Carrier suitable variant. Maximum commonality among the variants, consistent with National Disclosure Policy, will minimize total air system life cycle costs. Planning and pre-development systems engineering for Block 4 continues as Initial Operational Capability (IOC) is met for each variant during System Development and Demonstration (SDD).

The JSF Continuous Capability Development & Delivery(C2D2) efforts provide incremental warfighting capability improvements to maintain joint air dominance against evolving threats. Block 4 capability requirements were initiated through ongoing Service-led operational analysis of warfighting gaps identified in the Fifth Generation Fighter Modernization Initial Capabilities Document (ICD), and through F-35 JSF Block 4 Mission Decomposition analysis completed in FY2014. These analyses serve as the basis for the Block 4 (CDD), staffed through the Air Force Requirements Oversight Council (AFROC) and signed by the USAF Chief of Staff in January 2015. Joint Requirements Oversight Council (JROC) approved the CDD 21 March 2017. Modernization activities in FY2017 and FY2018 include systems engineering, risk reduction, and infrastructure required to deliver full air system Block 4 capabilities to support initial fleet availability of Block 4 upgrades in FY2021.

Block 4 efforts designated as Block 4 include a robust weapons integration portfolio and provide new opportunities for International Partners to assess, integrate, and field unique capabilities based on global sovereign requirements.

The United Kingdom, Italy, Netherlands, Turkey, Canada, Australia, Denmark and Norway are participants in F-35 modernization. The program shown here reflects United States Marine Corps funding. Total funding for all Service and International Partners is reported at the accomplishment/planned program level since activities support all aircraft variants. Foreign Military Sales are ongoing separately.

PE 0604840M/N replacing PE 0604810M/N beginning in FY19 due to budget being moved from BA05 to BA07.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0604840N *I (U)F-35C C2D2*			
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	0.000	252.360	223.901	-	223.901
Current President's Budget	0.000	227.998	383.741	-	383.741
Total Adjustments	0.000	-24.362	159.840	-	159.840
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-24.362			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	148.392	-	148.392
• Rate/Misc Adjustments	0.000	0.000	11.448	-	11.448

Change Summary Explanation

The FY2020 USN funding request was increased by $159.840 million to fund to fully fund to the cost estimate.

PE 0604840M/N replacing PE 0604810M/N beginning in FY19 due to budget being moved from BA05 to BA07.

Adjusted R-4 schedule as follows:
Updated previous milestones to reflect current F-35 Lightning II Joint Strike Fighter Acquisition Strategy, approved by USD(A&S)October 2018.

Technical: Not applicable.
Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604840N / *(U)F-35C C2D2*	Project (Number/Name) 2936 / *F-35C C2D2*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2936: *F-35C C2D2*	0.000	0.000	227.998	383.741	-	383.741	351.536	263.066	252.898	245.204	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 198

Note

Total cost, including International partner contributions, USN, USMC, and USAF funding: FY2020: $1,782.964M.

R-2A table shown above reflects service funding only.

R-2A (section B)/R-3 displays combined program for JSF Continuous Capability Development and Delivery (C2D2).

JSF C2D2 Includes:
USAF PE 0207142F BPAC 675346
USN PE 0604840N/ Project Unit 2936
USMC PE 0604840M Project Unit 3410
USN PE 0604810N/ Project Unit 2936
USMC PE 0604810M Project Unit 2935
USN PE 0604800N Project Unit 9999 (FY14): $1.500M
USMC PE 0604800M Project Unit 9999 (FY14): $1.500M
International Partner Contributions

A. Mission Description and Budget Item Justification

F-35 C2D2 provides continuing incremental upgrades of the three F-35 variants and associated ground equipment. Upgrades are essential capabilities for Air Interdiction and Strategic Attack, Close Air Support, Suppression and Destruction of Enemy Air Defenses, Offensive and Defensive Counter Air and expanded Surface Warfare. The C2D2 acquisition strategy is based upon incremental deliveries of capabilities. The strategy includes periodic deliveries with a focus on hardware, tech refresh and softwre. C2D2 capability planning includes an efficient transition from F-35 SDD to C2D2. As SDD development activities ramp down C2D2 will assume responsibility for improvements and modernization efforts.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development - Block 4 Planning and Systems Engineering	0.000	213.559	622.265	0.000	622.265
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Block 4 Planning and Systems Engineering preliminarily design and delta System requirements Review (SRR) for all variants of the F-35 Aircraft. Modernization efforts is the Requirements Decomposition of capabilities for the Block 4 upgrade to include sub-blocks. This is a continuation of the previous Block 4 Requirements Decomposition effort which will include activities leading up to a successful System Functional Review (SFR) and select facility upgrades required for Block 4 research, development, test and evaluation. Included in Block 4 are upgraded capabilities and continuous improvements to maintain Air System viability against evolving threats indicated in the Electronic Warfare Initial Capabilities Document (ICD), the Fifth Generation Fighter Modernization ICD, and the Block 4 Capability Development Document (CDD), reduce life cycle cost, and improve operational suitability. Expected completion of Block 4 System Requirements Review (SRR) and a Preliminary Design Review (PDR) will address additional Block 4 capabilities requirements. Continuous risk reduction, preplanning for subsequent Block 4 Modernization events, and investments to deliver the full Block 4 Air System capabilities are included. ***FY 2019 Plans:*** Continued from PE 0604810M/N. Continue Block 4 Phase II contract development. Conduct Block SRR and PDR activities as well as continuing risk reduction and planning. Continuing development and maturity of key long lead capabilities and service unique weapons. Begin Developmental Flight Test of initial Block 4 capabilities. ***FY 2020 Base Plans:*** Continue Block 4 contract development. Continue Post-PDR risk reduction activities to include completion of Developmental Flight Test. Continue with Agile development of capabilities through Developmental Flight Test. Continue development and maturity of key long lead capabilities and service unique weapons. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as Block 4 capabilities and development efforts ramp up.					
Title: Product Development - Technology Refresh 3 (TR-3)	0.000	98.000	195.600	0.000	195.600
Articles:	-	-	-	-	-
Description: Technology Refresh 3 (TR-3) Design Competition, Development, Integration, and Test. This is the design phase of TR-3 program fully supports Block 3F functionality and allows incorporation of all Block 4					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
capabilities documented in the System Requirements Document (SRD). TR-3 hardware redesign is required to support 4X processing growth factor based on the current processing estimates for all 3F capabilities. Redesign of TR-3 subsystems Integrated Core Processor (ICP), Aircraft Memory System (AMS), and Panoramic Cockpit Display (PCD)) configurations will contain new backplane technology, commercial operating systems, and modified middleware necessary to take the design of the TR-3 System through Critical Design Review (CDR). ***FY 2019 Plans:*** Continued from PE 0604810M/N. The TR-3 program will continue design toward Critical Design Review of the Integrated Core Processor (ICP), Panoramic Cockpit Display (PCD), and Aircraft Memory System (AMS). In addition the TR-3 program will prototype the middleware software that will enable F-35's new messaging architecture delivered as part of TR-3 and ensure compatibility with current F-35 sensors. Additionally the initial lab stand up will occur to ensure timely first article delivery to the production line in FY23. ***FY 2020 Base Plans:*** The TR-3 program will complete design for Critical Design Review of the Integrated Core Processor (ICP), Panoramic Cockpit Display (PCD), and Aircraft Memory System (AMS). In addition the TR-3 program will continue with the development of middleware software to ensure and validate compatibility with current F-35 sensors and weapon loads. Continued lab test and verification will ensure timely first article delivery to the production line by FY23. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as Block 4 capabilities and development efforts ramp up.					
Title: Infrastructure and Support Costs	0.000	185.163	205.811	0.000	205.811
Articles:	-	-	-	-	-
Description: Funding will support infrastructure investment planning and other test planning activities required for Block 4 development, integration, test and evaluation. Funding related to the Integrated Test Force, government, and contractor labor. Support efforts for airframe, air vehicle systems, mission systems, weapons integration, mission support, autonomic logistics development, joint reprogramming enterprise and modeling					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and simulation environment activities. Funding related to the Integrated Test Force, government, and contractor labor. Other costs in support of ranges, chase planes and DT site operations. ***FY 2019 Plans:*** Continued from PE 0604810M/N. Continue development support for defining, managing and acquiring the F-35 capability enhancements identified in approved requirements documents. Transfer of integrated test force requirement to Block 4 as F-35 SDD draws to closure. USAF only will fund additional PMA to transition to a final hybrid product support integrator (HPSI) which will support sustainment analysis with product support managers, focused on long term strategic planning and transition to a final integrated support plan. Conduct strategic basing analysis to determine permanent location for core of HPSI. ***FY 2020 Base Plans:*** Continue development support for defining, managing and acquiring the F-35 capability enhancements identified in approved requirements documents. Transfer of integrated test force requirement to Block 4 as F-35 SDD draws to closure. USAF only will fund additional PMA to transition to a final hybrid product support integrator (HPSI) which will support sustainment analysis with product support managers, focused on long term strategic planning and transition to a final integrated support plan. Conduct strategic basing analysis to determine permanent location for core of HPSI. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as Block 4 capabilities and development efforts ramp up.					
Title: Test and Evaluation	0.000	480.714	601.355	0.000	601.355
Articles:	-	-	-	-	-
Description: Developmental Test activities in support of Block 4, to include Lockheed Martin and Pratt & Whitney support at both test sites. Non-recurring engineering required to plan for the service life extension of existing DT aircraft and modification necessary to bring DT aircraft fleet to a more production representative and sustainable configuration. Additional upgrades required to support development and evaluation of improvements driven by changes in the threat environment and as identified in the Electronic Warfare ICD, the Fifth Generation Fighter Modernization ICS, and the Block 4 Capability Development Document (CDD).					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Continued from PE 0604810M/N. Funding will support flight test execution to ensure Block 4 capabilities are delivered as designed. Funding also supports investment planning and prioritization required to maintain future development capabilities. This includes instrumenting new DT aircraft, ordering the replacement of pre-LRIP aircraft engines, continuing the FY18 NRE work, and delivery and install of upgraded hardware as a part of the DT aircraft viability effort, as well as test engine support. Additionally, this funding supports laboratory upgrades required to support development and verification of capabilities in a relevant environment. ***FY 2020 Base Plans:*** Funding will support flight test execution to ensure Block 4 capabilities are delivered as designed. Funding also supports investment planning and prioritization required to maintain future development capabilities. This includes continuing work on instrumenting new DT aircraft, and delivery and install of upgraded hardware as part of the DT aircraft viability effort, as well as test engine support. Additionally, this funding supports laboratory upgrades required to support development and verification of capabilities in a relevant environment. Efforts include non-recurring engineering and procurement of a test article to evaluate service life of F-35B STOVL Aircraft. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as Block 4 capabilities and development efforts ramp up.					
Title: Autonomic Logistics Information System (ALIS) Development	0.000	120.926	157.933	0.000	157.933
Articles:	-	-	-	-	-
Description: Autonomic Logistics Information System (ALIS) continues to deliver the core logistics infrastructure requirements for the F-35 enterprise. ALIS includes features such as aircraft scheduling, training delivery and record keeping, technical data delivery, supply chain management, maintenance management, pilot and maintenance debriefing, and mission planning. The ALIS development program is focused on two primary lines of effort: Current ALIS which includes Agile DevOps, and ALIS Next. Current ALIS is focused on developing new software that uses the current software as a baseline and includes development of 3.5, 3.6 and 3.7 builds. The required new capabilities have been defined by the US Services					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and include cybersecurity updates, decentralized maintenance, Prognostic Health Monitoring (PHM), Training Management System upgrades, Personnel Flight Equipment (PFE), Low Observable Health Assessment System (LOHAS), Corrosion Management System, squadron resource sharing, and new propulsion capabilities. All aspects of ALIS software are included in current ALIS development. The software development will have applicability to the Standard Operating Units (SOU), Central Points of Entry (CPE), and the Autonomic Logistics Operating Unit (ALOU) for both classified and unclassified hardware. Under the umbrella of current ALIS, an Agile DevOps pilot is working to rapidly deliver capability updates to the fleet and change the way that current ALIS delivers software. ALIS Next is the re-architecture effort that began in FY19 and will complete fielding in FY23. ALIS Next will redesign ALIS software, data, and hardware architecture with a focus on cybersecurity, affordability, resiliency, and supportability. ***FY 2019 Plans:*** Continue Current ALIS software development efforts and deliver ALIS build 3.5, which contains critical software stabilization improvements. Current ALIS efforts will also continue to transition to a pure Agile DevOps development framework. ALIS Next efforts will produce a reference architecture and a detailed transition plan to the new architecture. ***FY 2020 Base Plans:*** Continue Current ALIS software development efforts as well as begin ALIS build 3.6. Increase the number of DevOps product teams and begin to merge with Current ALIS development efforts. Refactor ALIS software in accordance with the ALIS Next architecture developed in FY19. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to program growth as well as Current ALIS and ALIS Next efforts continue to ramp up.					
Accomplishments/Planned Programs Subtotals	0.000	1,098.362	1,782.964	0.000	1,782.964
USAF Continuous Capability Development and Delivery	-	426.494	694.455	-	694.455
F-35B C2D2	-	234.107	422.881	-	422.881

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
International Continuous Capability Development and Delivery	-	209.763	281.887	-	281.887
Navy Subtotals	0.000	227.998	383.741	0.000	383.741

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDT&E/0604840M/3410: *F-35B C2D2*	0.000	234.107	422.881	-	422.881	373.365	313.601	283.357	270.845	Continuing	Continuing
• USAF RDT&E/0207142F: *USAF Continuous Capability Development and Delivery*	0.000	426.494	694.455	-	694.455	786.513	550.100	451.737	522.023	Continuing	Continuing
• International: *International Continuous Capability Development and Delivery*	0.000	209.763	281.887	-	281.887	339.139	224.501	189.728	158.811	Continuing	Continuing

Remarks

This is a joint program with no executive service. Service Acquisition Executive (SAE) authority alternates between the Department of the Navy and the Department of the Air Force and currently resides with the Air Force. Program Element 0604800N/0604800M continues USN development efforts budgeted in 0603800N prior to FY2002. The United Kingdom, Italy, Netherlands, Turkey, Canada, Australia, Denmark, and Norway are participants in the SDD phase of JSF.

PE 0604810M/N ending in FY18 and continues in PE 0604840M/N as budget moves from BA05 to BA07.

D. Acquisition Strategy

The C2D2 acquisition strategy is to employ both Cost and Fixed Price Incentive contracts for the Block 4 engineering and development efforts. A new modernization contract structure will be established for all post SDD Block 4 efforts. In addition, a separate Basic Ordering Agreement or Indefinite Quantity/Indefinite Delivery contract is planned to provide a long term approach to upgrading and maintaining laboratories and test aircraft and supporting technology maturation for future C2D2 capabilities.

E. Performance Metrics

Overall Block 4 Performance Metrics will reflect Key Performance Parameters established in the F-35 Block 4 Capability Development Document.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prime LM 18-C-1004 (Phase II)	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		142.759	Dec 2018	416.615	Dec 2019	-		416.615	1,031.289	1,590.663	-
Prime LM 14-G-0020 (TR3)	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		98.000	Dec 2018	195.600	Dec 2019	-		195.600	510.000	803.600	-
Prime LM BOA 0020 (Nimble Lightning + Pilot Training)	C/CPFF	Various : Various	0.000	0.000		4.500	Jan 2019	4.650	Jan 2020	-		4.650	17.500	26.650	-
Flight Test Asset	Various	Lockheed Martin : FT. Worth, TX	0.000	0.000		139.110	Jan 2019	105.000	Jan 2020	-		105.000	406.000	650.110	-
Prime LM TBD DT AC Viability	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		32.750	Jan 2019	79.000	Jan 2020	-		79.000	415.000	526.750	-
Prime PW Propulsion	SS/CPFF	Pratt Whitney : East Hartford, Connecticut	0.000	0.000		136.000	Oct 2018	82.000	Oct 2019	-		82.000	220.000	438.000	-
Prime LM Developmental Foundation Contract	C/CPIF	Lockheed Martin : FT. Worth, TX	0.000	0.000		75.800	Nov 2018	201.000	Nov 2019	-		201.000	345.000	621.800	-
Prime TBD JRE Dev.	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		35.000	Jan 2019	85.200	Dec 2019	-		85.200	Continuing	Continuing	Continuing
Prime LM ALIS Next	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		16.411	Dec 2018	68.000	Dec 2019	-		68.000	Continuing	Continuing	Continuing
Prime LM ALIS Dev	C/CPIF	Lockheed Martin : FT. Worth, TX	0.000	0.000		50.000	Jul 2019	58.000	Dec 2019	-		58.000	0.000	108.000	-
Prime LM F-35B Fatigue Test Article	C/CPFF	Lockheed Martin : FT. Worth, TX	0.000	0.000		0.000		21.300	Jan 2020	-		21.300	97.000	118.300	-
Training Investments	C/CPIF	Lockheed Martin : FT. Worth, TX	0.000	0.000		0.000		45.000	Dec 2019	-		45.000	0.000	45.000	-
Systems Engineering	Various	Various : Various	0.000	0.000		31.300	Jan 2019	49.500	Jan 2020	-		49.500	88.000	168.800	-
		Subtotal	0.000	0.000		761.630		1,410.865		-		1,410.865	Continuing	Continuing	N/A

Remarks

FY2019 & FY2020 Product Development continued from PE 0604810M/N.
Combined ECASE contract line into Systems Engineering line to delete duplicative line items as ECASE contract is a vehicle used for Systems Engineering efforts.
Block 4 Modernization on R-2A includes Phase II, Nimble Lightning, JRE, Training Investments & Systems Engineering.
Flight Test assets include weapons to support Test and assests needed for flight test instrumentation.
Broke out Prime LM TBD JRE Dev line seperately from Block 4 Phase II contract line due to change in contracting strategy.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604840N / *(U)F-35C C2D2*	Project (Number/Name) 2936 / *F-35C C2D2*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Broke out Prime LM Current ALIS Dev & Prime LM ALIS Next efforts seperately from ALIS Re-architecture as directed by OSD(C). Added F-35B Fatigue Test Article and Training Investments lines in FY20.															

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JSE/IPT Development Support	WR	NAWCAD : Patuxent River, MD	0.000	0.000		32.400	Dec 2018	48.740	Dec 2019	-		48.740	Continuing	Continuing	Continuing
Development Support	WR	NAWCWD : China Lake, CA	0.000	0.000		6.275	Dec 2018	7.850	Dec 2019	-		7.850	43.083	57.208	-
Development Support	Various	Eglin : Various	0.000	0.000		3.500	Dec 2018	4.500	Dec 2019	-		4.500	15.268	23.268	-
Development Support	Various	Various : Various	0.000	0.000		22.212	Dec 2018	27.000	Dec 2019	-		27.000	34.513	83.725	-
Development Support	MIPR	AFRL : Wright Patterson AFB	0.000	0.000		3.978	Dec 2018	7.500	Dec 2019	-		7.500	13.923	25.401	-
JRE Development Support	C/BA	Various : Various	0.000	0.000		18.300	Dec 2018	25.900	Dec 2019	-		25.900	0.000	44.200	-
ALIS Development Support	Various	Various : Various	0.000	0.000		35.220	Dec 2018	16.933	Dec 2019	-		16.933	0.000	52.153	-
ALIS Next Development Support	MIPR	Various : Various	0.000	0.000		19.295	Dec 2018	15.000	Dec 2019	-		15.000	0.000	34.295	-
		Subtotal	0.000	0.000		141.180		153.423		-		153.423	Continuing	Continuing	N/A

Remarks

FY2019 & FY2020 Support continued from PE 0604810M/N.
Broke out JRE and ALIS Development Support from Block 4 Phase II contract line due to change in contracting strategy.
Broke out ALIS Next Development Support line per direction to add more detailed ALIS information.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCAD : Patuxent River, MD	0.000	0.000		54.000	Dec 2018	65.000	Dec 2019	-		65.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604840N / *(U)F-35C C2D2*	Project (Number/Name) 2936 / *F-35C C2D2*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCWD : China Lake , CA	0.000	0.000		6.500	Dec 2018	11.200	Dec 2019	-		11.200	40.470	58.170	-
Developmental Test & Evaluation Edwards/AFB	Various	Edwards AFB : Edwards AFB, CA	0.000	0.000		26.554	Dec 2018	22.455	Dec 2019	-		22.455	110.470	159.479	-
Developmental Test & Evaluation	Various	Various : Various	0.000	0.000		3.500	Dec 2018	4.200	Dec 2019	-		4.200	57.087	64.787	-
Operational Test & Evaluation	WR	Kirtland AFB, NM : Kirtland AFB, NM	0.000	0.000		6.500	Dec 2018	31.500	Dec 2019	-		31.500	72.500	110.500	-
		Subtotal	0.000	0.000		97.054		134.355		-		134.355	Continuing	Continuing	N/A

Remarks

FY2019 & FY2020 Test and Evaluation continued from PE 0604810M/N.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AFLCMC Civilian Pay	C/BA	AFLCMC CIVPAY : Wright Patterson, AFB	0.000	0.000		42.885	Oct 2018	44.172	Oct 2019	-		44.172	231.610	318.667	-
HPSI Program Sppt.	C/BA	AFLCMC : Wright Patterson, AFB	0.000	0.000		9.600	Oct 2018	0.000	Oct 2019	-		0.000	Continuing	Continuing	Continuing
Financial Mgmt Database Support IDS	C/BA	Various : Various	0.000	0.000		1.300	Dec 2018	1.565	Dec 2019	-		1.565	4.301	7.166	-
Earned Value/Finance/ Cost ACT-I	C/BA	Various : Various	0.000	0.000		4.079	Dec 2018	4.201	Dec 2019	-		4.201	23.518	31.798	-
Systems System High BOS	C/BA	Various : Various	0.000	0.000		8.532	Dec 2018	8.788	Dec 2019	-		8.788	45.342	62.662	-
Other CIO Services	C/BA	Various : Various	0.000	0.000		0.404	Dec 2018	2.127	Dec 2019	-		2.127	22.579	25.110	-
Other Core Civ Pay	WR	Various : Various	0.000	0.000		21.685	Dec 2018	11.000	Dec 2019	-		11.000	0.000	32.685	-
Other Core Contractor Sppt.	WR	Various : Various	0.000	0.000		6.437	Dec 2018	8.218	Dec 2019	-		8.218	0.000	14.655	-
Travel	Various	Various : Various	0.000	0.000		3.576	Oct 2018	4.250	Oct 2019	-		4.250	8.569	16.395	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0604840N / *(U)F-35C C2D2*	Project (Number/Name) 2936 / *F-35C C2D2*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			0.000	0.000		98.498		84.321		-		84.321	Continuing	Continuing	N/A

Remarks

FY2019 & FY2020 Management Services continued from PE 0604810M/N.
Breaking out HPSI AFLCMC funding from AFLCMC Civilian Pay line for visibility.
Added Other Core Civ Pay & Other Core Contractor Sppt to account for program operations support.
Beginning in FY20 HPSI will be in a seperate BPAC and no longer included in C2D2 budget docs.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Subtotals	0.000	0.000		1,098.362		1,782.964		-		1,782.964	Continuing	Continuing	N/A
USAF Continuous Capability Development and Delivery	-	-		426.494		694.455		-		694.455			-
F-35B C2D2	-	-		234.107		422.881		-		422.881			-
International Continuous Capability Development and Delivery	-	-		209.763		281.887		-		281.887			-
Project Cost Totals	0.000	0.000		227.998		383.741		-		383.741	0.000	0.000	-

Remarks

Subtotals and totals may not add due to rounding.

Prior Year reflects $0M due to PE 0604810M/N ending in FY18 and being replaced by PE 0604840M/N in FY19 as budget moves from BA05 to BA07.

FY 2019 reflects $426.494M USAF/$227.998M USN/$234.107M USMC/$209.763M International/Total $1,098.362M
FY 2020 reflects $694.455M USAF/$383.741M USN/$422.881M USMC/$281.887M International/Total $1,782.964M

R-2A (section B)/R-3 displays total combined program (i.e. not Service-specific), including International partners.

JSF Continuous Capability Development and Delivery (C2D2) Includes:
USAF PE 0207142F BPAC 675346
USN PE 0604810N Project Unit 2936 - ends FY18
USMC PE 0604810M Project Unit 2935 - ends FY18
USN PE 0604840N Project Unit 2936 - begins FY19
USMC PE 0604840M Project Unit 2935 - begins FY19
USN PE 0604800N Project Unit 9999 (FY14): $1.500
USMC PE 0604800M Project Unit 999 (FY14) : $1.500

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

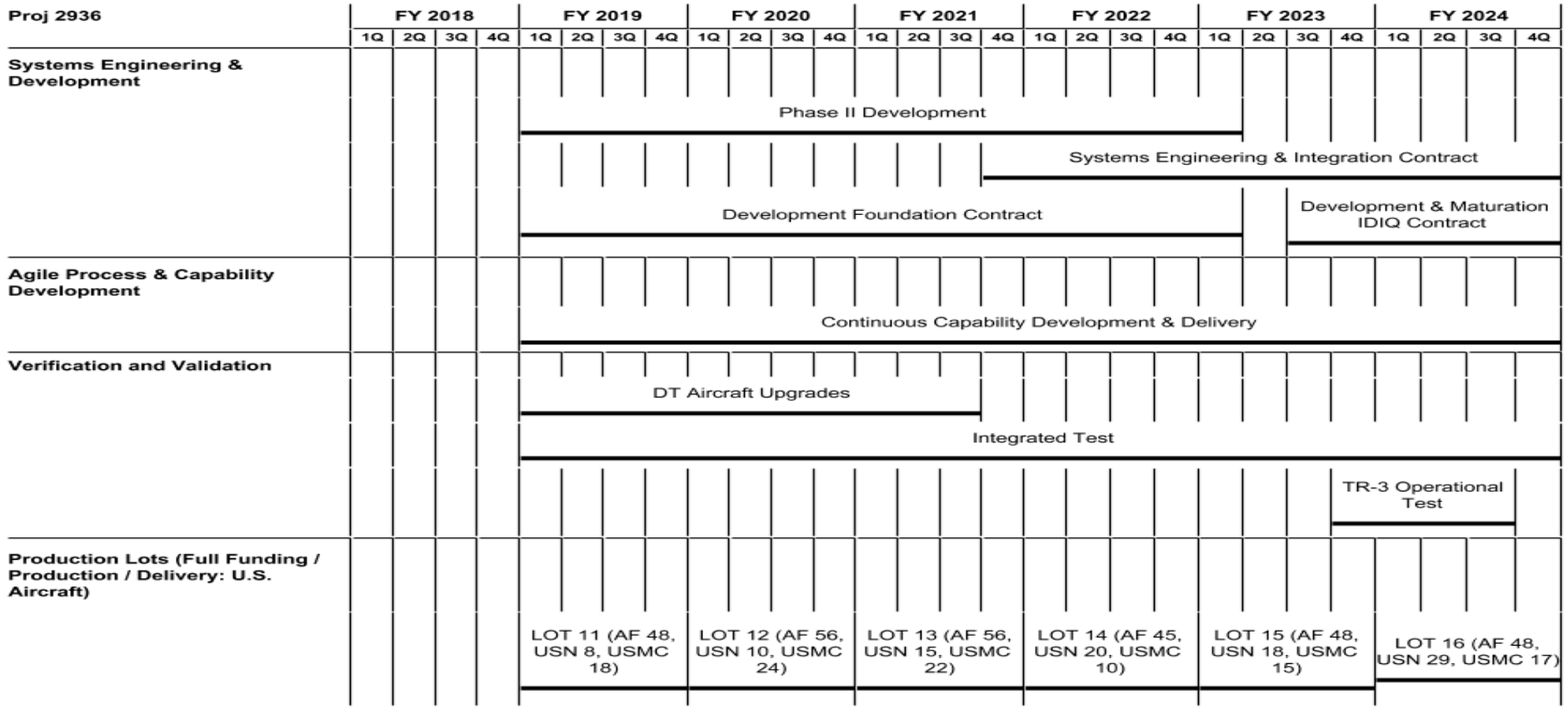

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0604840N / *(U)F-35C C2D2*	**Project (Number/Name)** 2936 / *F-35C C2D2*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2936				
Systems Engineering & Development: Phase II Development	1	2019	1	2023
Systems Engineering & Development: Systems Engineering & Integration Contract	4	2021	4	2024
Systems Engineering & Development: Development Foundation Contract	1	2019	1	2023
Systems Engineering & Development: Development & Maturation IDIQ Contract	3	2023	4	2024
Agile Process & Capability Development: Agile Process & Capability Development	1	2019	4	2024
Verification and Validation: DT Aircraft Upgrades	1	2019	3	2021
Verification and Validation: Integrated Test	1	2019	4	2024
Verification and Validation: TR-3 Operational Test	4	2023	3	2024
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 11 Full Funding / Production / Delivery	1	2019	4	2019
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 12 Full Funding / Production / Delivery	1	2020	4	2020
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 13 Full Funding / Production / Delivery	1	2021	4	2021
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Production / Delivery	1	2022	4	2022
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Production / Delivery	1	2023	4	2023
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Production / Delivery	1	2024	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607658N *I (U)Cooperative Engagement Capability*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	676.349	88.088	128.815	127.924	-	127.924	161.162	182.355	151.318	162.413	Continuing	Continuing
2039: *COOP Engagement*	676.349	77.472	128.815	109.496	-	109.496	124.865	138.306	118.401	127.165	Continuing	Continuing
3240: *CEC Increment II*	0.000	0.000	0.000	18.428	-	18.428	36.297	44.049	32.917	35.248	Continuing	Continuing
9999: *Congressional Adds*	0.000	10.616	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.616
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 582												

A. Mission Description and Budget Item Justification

The FY 2020 funding request was reduced by $12.900 million to account for the availability of prior year execution balances.

Cooperative Engagement Capability (CEC) significantly improves Battle Force Anti-Air Warfare (AAW) capability by coordinating all Battle Force AAW sensors into a single, real-time, composite track picture to support integrated fire control.

CEC distributes sensor data from each USMC Command Control Unit, US Navy Ship, and US Navy Aircraft, or Cooperating Unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data-rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapons system.

CEC significantly improves our Battle Force defense in depth, including both local area and ship defense capabilities against current and future AAW threats. Moreover, CEC provides critical connectivity and integration of over-land air defense systems capable of countering emerging air threats, including land attack cruise missiles, in a complex littoral environment.

The CEC Program Office oversees CEC development for all services with funding provided for their respective combat systems. CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and interface with Combat Systems and sensors. The DDS encodes and distributes own-ship sensor and engagement data and is a high capacity, jam resistant, directional system providing high data throughput as well common time and common positional frame of reference. The CEP is a high capacity distributed processor that processes data from all integrated radars. The data is passed to the ship's combat system as a high quality, common, continuous, engageable track.

The Navy implemented a Signal Data Processor (SDP) approach to modify the current equipment to meet reduced size, weight, cost, power and cooling objectives. This SDP approach also supports continuity for interoperability improvements and program protection, as well as supporting open architecture initiatives, and comms

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
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independence. The SDP hardware complies with Category 3 Open Architecture Computing Environment (OACE) standards. The SDP-S is being fielded fleet-wide to all US Navy, USMC, US Army, and FMS CEC units.

A family of antennas approach will be used to satisfy CEC requirements for obsolete components with lower life cycle costs (procurement, installation, and maintenance). These antennas enable future capability as well as providing a solution extensible to additional platforms. This effort for development and production of Common Array Block (CAB) antennas was competitively awarded in late FY2013.

Network Enabled Electronic Defense System (NEEDS) modifies CEC software to add significant Electronic Warfare capability.

CEC operates in increasingly contentious cyber-space. Measures are being taken to robustly mitigate, and where possible completely remediate cyber vulnerabilities.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	92.571	130.515	141.373	-	141.373
Current President's Budget	88.088	128.815	127.924	-	127.924
Total Adjustments	-4.483	-1.700	-13.449	-	-13.449
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.700			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-7.320	0.000			
• SBIR/STTR Transfer	-3.064	0.000			
• Program Adjustments	0.000	0.000	-12.898	-	-12.898
• Rate/Misc Adjustments	0.001	0.000	-0.551	-	-0.551
• Congressional Directed Reductions Adjustments	-5.100	-	-	-	-
• Congressional Add Adjustments	11.000	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *CEC Identification Friend or Foe (IFF) Mode 5 Acceleration*	10.616	0.000
Congressional Add Subtotals for Project: 9999	10.616	0.000
Congressional Add Totals for all Projects	10.616	0.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
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Change Summary Explanation

- FY 2018 decrease of -$4.483M included: +$11.000M for a Congressional add, -$5.100M for a Congressionally directed reduction, -$3.064M for Small Business Innovative Research (SBIR) transfer, and -$7.320 below threshold reprogramming.
- FY 2019 decrease of -$1.700M reflects a Congressionally directed general reduction for Enterprise Air Surveillance Radar (EASR) Delayed New Start.
- FY 2020 decrease of -$13.449M included: -$12.900M reduction to account for the availability of prior year execution balances, and -$0.551M for various rate adjustments.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2039: *COOP Engagement*	676.349	77.472	128.815	109.496	-	109.496	124.865	138.306	118.401	127.165	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 582

A. Mission Description and Budget Item Justification

Cooperative Engagement Capability (CEC) significantly improves Battle Force Anti-Air Warfare (AAW) capability by coordinating all Battle Force AAW sensors into a single, real-time, composite track picture to support integrated fire control.

CEC distributes sensor data from each USMC Command Control Unit, US Navy Ship, and US Navy Aircraft, or Cooperating Unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data-rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapons system.

CEC significantly improves our Battle Force defense in depth, including both local area and ship defense capabilities against current and future AAW threats. Moreover, CEC provides critical connectivity and integration of over-land air defense systems capable of countering emerging air threats, including land attack cruise missiles, in a complex littoral environment.

The CEC Program Office oversees CEC development for all services with funding provided for their respective combat systems. CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and interface with Combat Systems and sensors. The DDS encodes and distributes own-ship sensor and engagement data and is a high capacity, jam resistant, directional system providing high data throughput as well common time and common positional frame of reference. The CEP is a high capacity distributed processor that processes data from all integrated radars. The data is passed to the ship's combat system as a high quality, common, continuous, engageable track.

The Navy implemented a Signal Data Processor (SDP) approach to modify the current equipment to meet reduced size, weight, cost, power and cooling objectives. This SDP approach also supports continuity for interoperability improvements and program protection, as well as supporting open architecture initiatives, and comms independence. The SDP hardware complies with Category 3 Open Architecture Computing Environment (OACE) standards. The SDP-S is being fielded fleet-wide to all US Navy, USMC, US Army, and FMS CEC units.

A family of antennas approach will be used to satisfy CEC requirements for obsolete components with lower life cycle costs (procurement, installation, and maintenance). These antennas enable future capability as well as providing a solution extensible to additional platforms. This effort for development and production of Common Array Block (CAB) antennas was competitively awarded in late FY2013.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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Network Enabled Electronic Defense System (NEEDS) modifies CEC software to add significant Electronic Warfare capability.

CEC operates in increasingly contentious cyber-space. Measures are being taken to robustly mitigate, and where possible completely remediate cyber vulnerabilities.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: E-2D	3.043	4.017	3.874	0.000	3.874
Articles:	-	-	-	-	-
FY 2019 Plans: Complete E-2D DSSC 3 CEC Independent Verification and Validation (IV&V) Testing and the Product Certification Panel (PCP). Continue lab test data analysis and development and implementation of fixes to high priority discrepancy reports. Conduct software fleet release preparations. Begin E-2D DSSC 4 CEC development and integration to incorporate Dynamic CEP ID with Platform Registration and Network Enabled Electronic Defense System (NEEDS) Increment 1. Support interface and software changes related to select DSSC 4 capabilities driven by E-2D program requirements. Draft E-2D DSSC 5 Requirements and support E-2D platform requirements development.					
FY 2020 Base Plans: Continue CEC software development and test in support of the E-2D DSSC 4 software upgrade program. Support test event planning and conduct, analyze test data and identify, prioritize, and implement trouble report corrective actions in CEC software. Prepare for DSSC 4 CEC software FQT. Perform detailed design efforts for E-2D DSSC 5 CEC software, including interface development and integration of CEC capabilities, Signal Data Processor-Sierra (SDP-S) processor upgrade, Surface Tracking), and of E-2D networking and sensor capability and performance improvements included in DSSC 5 software and associated hardware.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to completion of DSSC-3 Software testing late in FY 2019.					
Title: B/L 2.1 INTEGRATION AND FOT&E TESTING	9.845	11.330	10.925	0.000	10.925
Articles:	-	-	-	-	-
FY 2019 Plans: Complete testing of CEC AN/USG-3B with E-2D DSSC-3. Continue Developmental Testing (DT-D2) of AN/USG-2B with CVN 78. Conduct three Underway tracking events onboard USS GERALD R FORD. Conduct					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
6 tracking events and 6 live fire events onboard Self Defense Test Ship (SDTS). Support E-2D DSSC-3 Operational Testing (OT) preparation and test execution. Conduct NIFC-CA Live Fire Test #7 (two live fire events) at White Sands Missile Range (WSMR) and two at-sea live fire test events. Conduct tracking events prior to each live fire event. Continue CEC Developmental Test (DT-D3) of AN/USG-2B with DDG 1000 combat system. Complete remaining live-fire (six) and six remaining tracking events onboard SDTS. Conduct multiple tracking events and the first ever live-fire test onboard DDG 1000. Continue CEC Developmental Test (DT-D4) of AN/USG-2B with Aegis Advanced Capability Build (ACB) 16 at the Wallops Island Land Based Test Sites and at sea onboard USN Ships. Conduct CSSQT aboard USS OSCAR AUSTIN (DDG 79), USS HOWARD (DDG 83), USS COWPENS (CG 63), and USS GETTYSBURG (CG 64). Continue testing of NEEDS at LBTS and conduct testing onboard USN Ships. Continue testing of CET and CTT at Land Based Test Site (LBTS) and commence CET and CTT testing onboard USN Ships. ***FY 2020 Base Plans:*** Continue Developmental Testing (DT-D2) of AN/USG-2B with CVN 78. Conduct 3 Underway tracking events onboard USS GERALD R FORD. Complete live fire testing for CVN 78 combat system configuration onboard Self Defense Test Ship (SDTS). Commence testing of CEC AN/USG-3B with E-2D DSSC-4. Conduct underway NIFC-CA Live Fire Test and live fire test at White Sands Missile Range (WSMR). Conduct tracking ents prior to each live fire. Continue CEC Developmental Test (DT-D3) of AN/USG-2B with DDG 1000 combat system. Conduct multiple tracking events and multiple live fire test events onboard USS ZUMWALT (DDG 1000), including first testing in a multi-node CEC Network environment. Continue CEC Developmental Test (DT-D4) of AN/USG-2B with Aegis ACB 16 at the Wallops Island Land Based Test Sites and at sea onboard USN Ships. Conduct CSSQT aboard USS OSCAR AUSTIN (DDG 79), USS HOWARD (DDG 83), USS COWPENS (CG 63), and USS GETTYSBURG (CG 64). Commence testing of Common Array Block antenna - Shipboard (CAB-S) at the Wallops Island Land Based Test Site. Continue testing of NEEDS on multiple USN Ships. Continue testing of CET and CTT on multiple USN Ships. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease is due to completion of NIFC-CA Increment 1 Testing at the end of FY2019.					
Title: SYSTEM IMPROVEMENTS	21.243	23.799	20.472	0.000	20.472
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Continue integration and software updates to support AEGIS ACB 16, including NEEDS capability integration. Conduct Product Release Panel (PRP) to support DDG and CG ACB 16. Modernization Combat System Ship Qualification and Trials (CSSQT) and PCP for software delivery to support ACB 16 Combat System Certification Panel (CSCP) in FY20. Continue software development for AN/SPY-6(V)1 and AEGIS ACB 20 integration. Develop and test SW Build Releases (SBR) #2, #3, and #4 and conduct two Software Build Reviews (SBRs) for AEGIS ACB 20. Develop and test SW Build Release #5 for final CEC system integration with CAB Family of Antennas (FoA). Develop critical Product Trouble Report (PTR) fixes that are discovered from CVN 78 at-sea testing to support CEC integration with Dual Band Radar (DBR) and SSDS MK2 Mod 6C combat system. For CEC Enhanced Networks (CEN) continue development of features in the Data Distribution System (DDS) software, including delivery of software components to the Office of Naval Research (ONR), to support the Mission Based Networking for DDS (MiND) Technology Readiness Level (TRL) 6 demonstration scheduled for FY20 in support of the Communications and Interoperability for Integrated Fires (CIIF) Future Naval Capability (FNC) project.					
FY 2020 Base Plans: Continue integration and software updates to support AEGIS ACB 16. Conduct Product Release Panel (PRP) to support DDG and CG ACB 16. Modernization Combat System Ship Qualification and Trials (CSSQT) and PCP for software delivery to support ACB 16 Combat System Certification Panel (CSCP) in FY20. Continue software development for AN/SPY-6(V)1 and AEGIS ACB 20 integration. Develop and test SW Build Releases (SBR) #2, #3, and #4 and conduct two Software Build Reviews (SBRs) for AEGIS ACB 20. Develop and test SW Build Release #5 for final CEC system integration with CAB Family of Antennas (FoA). Develop critical Product Trouble Report (PTR) fixes that are discovered from CVN 78 at-sea testing to support CEC integration with Dual Band Radar (DBR) and SSDS MK2 Mod 6C combat system.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
For CEC Enhanced Networks (CEN) continue development of features in the Data Distribution System (DDS) software, including delivery of software components to the Office of Naval Research (ONR), to support the Mission Based Networking for DDS (MiND) Technology Readiness Level (TRL) 6 demonstration scheduled for FY20 in support of the Communications and Interoperability for Integrated Fires (CIIF) Future Naval Capability (FNC) project. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease is due to reduction of the number of PTR fixes for CVN 78 software.					
Title: NETWORK ENABLED ELECTRONIC DEFENSE SYSTEM (NEEDS)	3.312	4.610	2.080	0.000	2.080
Articles:	-	-	-	-	-
FY 2019 Plans: Conduct Integration Verification and Validation at Raytheon Development Facility. Conduct government Independent Verification and Validation (IV&V) and Final Qualification Testing (FQT). Develop critical Product Trouble Report (PTR) fixes that are discovered during testing conducted at Land Based Test Site (LBTS), onboard USN Ships, or during IV&V and FQT testing. Conduct Product Certification Panel (PCP) for software delivery to support Aegis Light Off (ALO) of DDG 79 near the beginning of FY19 and Combat System Shipboard Qualification Trial (CSSQT) near the end of FY19. ***FY 2020 Base Plans:*** Develop critical Product Trouble Report (PTR) fixes that are discovered during testing conducted at LBTS, onboard USN Ships, or during Independent Verification and Validation (IV&V) testing in support of Combat System Certification Panel (CSCP) for AWS 9.2.1, and CSSQT for LHD-6. Support early Operational Test (OT) preparation for DSSC 4 on Advanced Hawkeye (AHE). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Decrease is due to completion of development and integration and transition to test support/maintenance at the end of FY 2019.					
Title: FIELD ACTIVITIES	7.697	9.373	8.774	0.000	8.774
Articles:	-	-	-	-	-
FY 2019 Plans: Continue field activity support of CEC development and fielding efforts (including Software Engineering / Integration Agent(SE/IA), Technical Direction Agent, In-Service Engineering Agent, Integrated Logistics Support planning) and program management support. Facilitate fielding or systems improvements and maintenance efforts.					
FY 2020 Base Plans: Continue field activity support of CEC development and fielding efforts (including Software Engineering / Integration Agent (SE/IA), Technical Direction Agent, In-Service Engineering Agent, Integrated Logistics Support planning) and program management support. Facilitate fielding or systems improvements and maintenance efforts.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to retirement of AN/USG-2A early in FY 2020 and completion of Software Maintenance Build installations at the end of FY 2019.					
Title: COMMON ARRAY BLOCK (CAB) ANTENNA	14.700	9.649	7.746	0.000	7.746
Articles:	-	-	-	-	-
FY 2019 Plans: Complete EDM development and test. Complete Antenna Power Supply Unit (APSU) build and test. Fabricate CAB-S and CAB-E Pre-Production Units (PPU). Begin build and test of CAB Pre-Production Units (PPU). Conduct risk reduction barge shock test on CAB-S. Develop CAB software Build 4, and commence development of CAB final software Build 5. Develop and deliver CAB Interactive Electronic Technical Manuals, Corrective Maintenance Exercises, and Product Structure Engineering Change Proposals.					
FY 2020 Base Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Perform Physical Configuration Audit for Pre-Production Units (PPUs). Complete PPU Qualification Tests. Complete unit test and deliver CAB software Build 5. Deliver CAB-E and CAB-S PPUs for DT. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease is due to completion of software development and transition to test support/sustainment.					
Title: NAVAL INTEGRATED FIRE CONTROL-COUNTER AIR (NIFC-CA) ***Articles:*** ***FY 2019 Plans:*** Complete Software Integration of NIFC-CA Increment 2. Conduct Product Certification Panel (PCP) in support of final delivery of NIFC-CA Increment 2. Support Land Based Test Site and At Sea Developmental Testing (DT) of NIFC-CA Increment 2. Conduct analysis of Land Based Test Site and at-sea test data in support of future NIFC capabilities. Continue requirements development for NIFC Increment 3. ***FY 2020 Base Plans:*** Begin Robust Systems engineering for NIFC Increment 3 in close conjunction with other NIFC Pillars. Conduct Modeling and Simulation (M&S) to inform Requirements and conduct element SRR. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease is due to completion of software development and transition to test support/sustainment.	0.000 -	6.871 -	6.625 -	0.000 -	6.625 -
Title: FIRE CONTROL LOOP IMPROVEMENT INITIATIVE (FCLIP) PHASE 2 ***Articles:*** ***FY 2019 Plans:*** Develop Software Build Release (SBR) and MK-9 Multi-Target Tracker (MTT) testing and data analysis. Conduct Engineering Verification Tests (EVT) and Product Release Panels (PRP) to support Combat System Lite Off (CSLO) and testing on SSDS ships. Conduct CEC Final Qualification Test (FQT) prior to software	6.623 -	8.700 -	4.453 -	0.000 -	4.453 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
delivery to the government. Conduct government Independent Verification and Validation (IV&V) testing and Product Certification Panel (PCP) for software delivery to support Combat System Certification Panel. ***FY 2020 Base Plans:*** Perform baseline certification efforts for the FCLIP product baseline in support Combat System events including CVN 70 Composite Surface Track (CST), CVN 70 Combat System Light Off (CSLO), LHD 6 CSLO & Combat System Shipboard Qualification Trial (CSSQT) and LPD 23 CSLO. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease is due to completion of software development and transition to test support/sustainment.					
Title: PROGRAM PROTECTION	7.518	8.527	9.205	0.000	9.205
Articles:	-	-	-	-	-
FY 2019 Plans: Provide CEC Program Protection support to manage risks from foreign intelligence collection threats to CEC hardware, software, or supply chain exploitation. The CEC DoD unique or critical technologies are required to be protected using threat resistant anti-tamper technologies. The effort will further the use of the threat resistant anti-tamper technologies within the program. CEC will work closely with the Cyber Assessment Agency and Defense Assessment Management Office to access impacts to the program from exploitation. ***FY 2020 Base Plans:*** Provide CEC Program Protection support to manage risks from foreign intelligence collection threats to CEC hardware, software, or supply chain exploitation. The CEC DoD unique or critical technologies are required to be protected using threat resistant anti-tamper technologies. The effort will further the use of the threat resistant anti-tamper technologies within the program. CEC will work closely with the Cyber Assessment Agency and Defense Assessment Management Office to access impacts to the program from exploitation. ***FY 2020 OCO Plans:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase is due to starting integration and qualification phase of development.					
Title: CEC INCREMENT 2	1.253	3.300	1.818	0.000	1.818
Articles:	-	-	-	-	-
Description: CEC Increment 2 refers to initial efforts to expand CEC tracking capabilities to include surface tracking and other experimental / proof of concept efforts. CEC Increment 2 does not cover efforts associated with CEC Increment II. CEC Increment II is covered under PE 0607658N / (U)Cooperative Engagement Capability Project 3240 / CEC Increment II starting in FY20. ***FY 2019 Plans:*** Complete Close In Weapon System (CIWS) dual mount integration, continue testing of advanced CEC kernel functions informed by Fire Control Loop Improvement Project (FCLIP) Phase 2 test events. Continue development of prototype tactical software in preparation for a 2020 demonstration of ABMA (electronic warfare coordination and sensors weapons coordination) in close coordination with the ONR Coordinated RF for Electronic Warfare (CRFEW) project. ***FY 2020 Base Plans:*** In close alignment with FCLIP Phase 2, complete Product Certification Panel (PCP) and begin fielding of surface sensors in CEC Continue experimentation for ABMA and participate in both Land Based Testing, and conduct an at-sea Demonstration of advanced warfare coordination for Electronic Warfare (EW) features in conjunction with the CRFEW project. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease is due to completion of surface sensor integration and transition to test support/sustainment.					
Title: ENTERPRISE AIR SURVEILLANCE RADAR (EASR)	2.238	5.200	7.452	0.000	7.452
Articles:	-	-	-	-	-
FY 2019 Plans: Continue technical documentation analysis of EASR, NGSSR and SSDS ACB 20 combat system in support of SETR milestones and Agile software development Sprint reviews. Continue CEC requirements capture,					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
architecture design and software development for the CEC adaptive layers for Rotator and Fixed variants of EASR, NGSSR and SSDS ACB 20 combat system for CVN and L-Class ships. Continue integration testing with the EASR Simulator and commence integration testing with the EASR Emulator. Conduct one CEC-EASR-SSDS Software Build TIM (SBT) in FY19. Conduct SSDS ACB 20 System Requirement Review (SRR). ***FY 2020 Base Plans:*** Continue CEC Agile software development, coding and integration of the CEC adaptive layers for each of the EASR variants (Rotator & Fixed Array), NGSSR and SSDS ACB 20 combat system for CVN and L-Class ships. Commence Combat System Integration testing with the SSDS ACB 20 baseline and EASR variant 1 Engineering Development Model (EDM) at the Wallops Island Land Based Test Site (LBTS). Continue integration testing with the EASR Simulator and Emulator with the EDM at the LBTS, Wallops Island. Commence CEC Software Baseline Development (2.1.11) for SSDS ACB 20 and EASR. Support NGSSR testing at LBTSs and at sea. Conduct CEC EASR SFR and two CEC/EASR Software Build Reviews. Support SSDS ACB 20 PDR and CDR and NGSSR Test Readiness Review (TRR). Continue support for Technical Interchange Meetings (TIM), CEC SSDS In Process Reviews (IPRs) and EASR, NGSSR and ACB 20 Working Groups. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase is due to increased test schedule at Land Based Test Sites and commencement of At-sea testing. .					
Title: CEC FAR-TERM INTEROPERABILITY IMPROVEMENT PROJECT (FTIIP)	0.000	6.500	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: Complete integration and certification of Identification Friend or Foe (IFF) improvements (including Mode 5 related software trouble report corrections and IFF processing design changes) for AEGIS Baseline 7.2, 9.2.0, SSDS Blds 6 and 9, E-2D Delta System Software Configuration 3 (DSSC 3) and USMC configurations. Commence development of CEC integration with IFF Mode S and Automatic Dependent Surveillance - Broadcast (ADS-B) systems. Coordinate system and subsystem requirements and integration with Aegis, Ship Self Defense System (SSDS), and E-2D Advanced Hawkeye Programs. Conduct System Requirements Review (SRR)					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and System Functional Review (SFR). ***FY 2020 Base Plans:*** CEC FTIIP efforts transition to PE 0607658N / (U)Cooperative Engagement Capability Project 3240 / CEC Increment II in FY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** CEC FTIIP efforts transition to PE 0607658N / (U)Cooperative Engagement Capability Project 3240 / CEC CDD Increment II in FY20.					
Title: DIGITAL WARFARE TACTICAL NETWORKING INITIATIVE IMPLEMENTATION	0.000	17.900	23.100	0.000	23.100
Articles:	-	-	-	-	-
FY 2019 Plans: Lead a Cross Functional Team (CFT) with participation from key naval tactical network organizations and fleet representation to conduct initial systems engineering and experimentation for improving tactical data dissemination to support further development of Integrated Fire Control concepts. Assist Office of Naval Research (ONR) in Communication-as-a-Service (CaaS) technology maturation. This includes early investigation of CaaS implementation across multiple radios, waveforms, and network architectures; develop early Model Based System Engineering (MBSE) SysML models; and Software-in-the-Loop (SIL) and Land Base Test Site (LBTS) experimentation to formulate the solution toward the development of Fleet Tactical Grid and Distributed Maritime Operations. ***FY 2020 Base Plans:*** Continue leading a Cross Functional Team (CFT) with participation from key naval tactical network organizations and fleet representation to conduct initial systems engineering and experimentation for improving tactical data dissemination to support further development of Integrated Fire Control concepts. Continue Communication-as-a-Service (CaaS) technology maturation and experimentation. This includes further investigation of CaaS implementation across multiple radios, waveforms, and network architectures; continue development of Model Based System Engineering (MBSE) SysML models; and prepare for and conduct At-Sea experimentation to formulate the solution toward the development of Fleet Tactical Grid and Distributed Maritime Operations. Begin					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
development of hardware requirements and conduct preparation for element level System Requirements Review (SRR) to incorporate CaaS across multiple radios waveforms, and network architectures. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase is due to At-Sea experimentation and preparation for element level System Requirements Review (SRR) in FY 2020.					
Title: CEC CYBER RESILIENCY	0.000	4.487	1.452	0.000	1.452
Articles:	-	-	-	-	-
FY 2019 Plans: Address and retire interface issues between CEC and host Combat Systems including AEGIS Advanced Capability Build (ACB) 16, CVN 78 and Land Based and Airborne platforms. Incorporate a limited subset of planned CEC system hardware and software changes identified via the cyber accreditation process as well as required Information Assurance Vulnerability Management (IAVM) updates into incremental CEC system software builds. Prepare for Final Qualification and Verification and Validation testing events of CEC system baselines with hardware and software changes addressing cyber high risk issues, though on a reduced scope basis, so not all planned corrective actions may be incorporated. ***FY 2020 Base Plans:*** Conduct Final Qualification Tests (FQTs), Independent Verification and Validation (IV&V), and Product Certification Panels (PCPs), for cyber functionality developed in FY 19 for Aegis Weapons System (AWS) 6.3/7.2/9.2.0. Commence addressing CEC Cyber requirements in AEGIS ACB 20 and SSDS ACB 20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease is result of reduction in funding for Cyber Resiliency to support higher priority efforts. Plans to conduct Ship Self Defense System (SSDS) Final Qualification Tests (FQTs), Independent Verification and Validation (IV&V), and Product Certification Panels (PCPs) for cyber functionality was removed in FY 20.					
Title: CRYPTO MODERNIZATION	0.000	4.552	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: The CEC Program will continue a cryptographic modernization effort for the Signal Data Processor (SDP) that is being developed to support the significant increase in cryptographic processor capability that is required to protect the CEC network. Conduct Modeling and Simulation to inform requirements definition. Complete system requirements review. ***FY 2020 Base Plans:*** CEC Crypto Modernization efforts transition to PE 0607658N / (U)Cooperative Engagement Capability Project 3240 / CEC CDD Increment II in FY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** CEC Crypto Modernization efforts transition to PE 0607658N / (U)Cooperative Engagement Capability Project 3240 / CEC Increment II in FY20.					
Title: ELEKTRA ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** In close coordination with IWS 2, PMA 231, IWS 1, ONR, and NRL, begin experimentation with prototype systems in Modeling and Simulation (M&S) environment to inform Program of Record (PoR) feature providing Artificial Intelligence for coordination phase of combat. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase is due to start of development in FY 2020.	0.000 -	0.000 -	1.520 -	0.000 -	1.520 -
Accomplishments/Planned Programs Subtotals	77.472	128.815	109.496	0.000	109.496

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• SCN: *Navy, SCN*	28.027	23.018	35.481	-	35.481	33.063	42.679	49.640	72.577	232.834	900.219
• APN/0204152N: *Navy, APN*	16.924	13.810	14.086	-	14.086	14.368	18.319	26.160	0.000	15.223	389.008
• OPN/2606: *CEC*	23.891	39.076	35.128	-	35.128	34.457	34.745	33.909	34.654	31.641	1,096.020
• RDT&E/0206313M: *USMC*	2.600	1.279	1.317	-	1.317	1.357	1.398	1.440	1.483	0.000	24.024
• O&M,N/0206626M: *USMC*	1.958	2.378	2.970	-	2.970	3.059	3.162	3.257	3.290	0.000	20.074
• PMC/0206313M: *USMC*	0.178	5.808	8.142	-	8.142	12.307	0.000	0.000	0.000	0.000	30.983
• OPN/0960: *CG MOD*	4.650	1.869	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	840.819

Remarks

D. Acquisition Strategy

Full Rate Production for CEC AN/USG-3B variant approved April 2014. Latest revision of CEC Acquisition Strategy (AS) approved by ASN (RDA) on 2 November 2017. Latest revision of CEC Acquisition Plan (AP) was approved in July 2018.

Contracts:
Common Array Block (CAB) antenna - contract competitively awarded 4Qtr FY2013.
CEC Design Agent/Engineering Services (DA/ES) follow-on sole source contract awarded 4Qtr FY2013. A sole source 15 month contract extension will be awarded in 4Qtr FY2018.
CEC DA/ES contract will be competitively awarded 4Qtr FY2019. For DA, the contractor will maintain the CEC hardware and software development environment and testing infrastructure including; Systems and Software Laboratories, the external RF Range, the Compact Antenna Range, and the CEC Classified Development LAN. For ES, the contractor
CEC Production - Contract competitively awarded in 2Qtr FY2015.
CEC SDP-S Production - Contract competitively awarded in 4Qtr FY2017.
CEC PAAA Competitive - RFP was issued in 4Qtr FY2018. Contract award is scheduled for 1Qtr FY2020.

E. Performance Metrics

CEC metrics per year in support of all budget lines:

- Maintain 3 CEC software baselines and 19 software versions
- Conduct 3 Software Build Reviews
- Conduct 3 Software Product Certification Panels and 5 Product Review Panels
- Deliver 78 software builds
- Conduct 10 Technical Interchange Meetings (TIM) with the Design Agent

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

- Conduct 10 Systems Engineering Integrated Product Team (SEIPT) meetings
- Conduct 12 In Process Reviews (IPR)
- Execute 48 Developmental and Operational Test (DT/OT) or At-Sea test events

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / *(U)Cooperative Engagement Capability*	Project (Number/Name) 2039 / *COOP Engagement*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/USG-2/3 Design Agent/Engineering Services	C/CPFF	Raytheon : St. Petersburg, FL	136.461	11.238	Oct 2017	12.579	Oct 2018	12.294	Oct 2019	-		12.294	Continuing	Continuing	Continuing
TDA	C/CPFF	JHU/APL : Laurel, MD	86.885	11.635	Oct 2017	12.157	Oct 2018	12.217	Oct 2019	-		12.217	Continuing	Continuing	Continuing
SI/DA	C/CPAF	General Dynamics : Fairfax, VA	23.979	0.000		0.000		0.000		-		0.000	0.000	23.979	-
SI/DA	C/CPAF	Award Fees : Not Specified	2.903	0.000		0.000		0.000		-		0.000	0.000	2.903	-
DDG 1000	C/CPAF	Raytheon : Massachusetts	10.983	0.000		0.000		0.000		-		0.000	0.000	10.983	-
DDG 1000	C/CPAF	Award Fees : Not Specified	0.447	0.000		0.000		0.000		-		0.000	0.000	0.447	-
NIFC-CA Integration	Various	Various : Various	47.499	0.000	Oct 2017	6.871	Oct 2018	6.625	Oct 2019	-		6.625	Continuing	Continuing	Continuing
In-Service Engineering Activity	WR	NSWC : Port Hueneme, CA	8.088	2.305	Oct 2017	3.435	Oct 2018	1.745	Oct 2019	-		1.745	Continuing	Continuing	Continuing
Software Support Activity/ SEIA	WR	NSWC : Dahlgren, VA	21.433	2.367	Oct 2017	3.478	Oct 2018	1.478	Oct 2019	-		1.478	Continuing	Continuing	Continuing
Production Engineering Activity	WR	NSWC : Crane, IN	5.952	0.395	Oct 2017	0.523	Oct 2018	0.512	Oct 2019	-		0.512	0.000	7.382	-
JTRS	Various	Various : Various	8.500	0.000		0.000		0.000		-		0.000	0.000	8.500	-
Various	WR	Various : Various	31.873	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
NAVSSI	WR	SPAWAR : San Diego, CA	0.368	0.000		0.000		0.000		-		0.000	0.000	0.368	-
Certification	MIPR	NSA : Fort Meade, MD	1.200	0.000		0.000		0.000		-		0.000	0.000	1.200	-
Certification	WR	SPAWAR : Charleston, SC	0.930	0.000		0.000		0.000		-		0.000	0.000	0.930	-
Joint Exercises	WR	Various : Various	3.744	0.000		0.000		0.000		-		0.000	0.000	3.744	-
LBTS Testing	WR	CDSA Dam Neck : Virginia Beach, VA	7.995	0.500	Oct 2017	0.500	Oct 2018	0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LBTS Testing	WR	SCSC : Wallops Island, VA	7.583	0.500	Oct 2017	0.500	Oct 2018	0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing
E-2D Integration	Various	Various : Various	50.580	3.043	Oct 2017	4.017	Oct 2018	3.874	Oct 2019	-		3.874	Continuing	Continuing	Continuing
MSI/NCCT	MIPR	Wright Patterson AFB : Dayton, OH	1.228	0.000		0.000		0.000		-		0.000	0.000	1.228	-
Common Array Block Development	C/CPFF	Raytheon : St. Petersburg, FL	50.761	14.700	Oct 2017	9.649	Oct 2018	7.746	Oct 2019	-		7.746	Continuing	Continuing	Continuing
NEEDS	Various	Various : Various	38.530	3.312	Oct 2017	4.610	Oct 2018	2.080	Oct 2019	-		2.080	Continuing	Continuing	Continuing
AMDR	Various	Various : Various	17.308	0.000	Oct 2017	0.000	Oct 2018	0.000		-		0.000	Continuing	Continuing	Continuing
JTMC	C/CPFF	Raytheon : St. Petersburg, FL	1.000	0.000		0.000		0.000		-		0.000	0.000	1.000	-
FCLIP	Various	Various : Various	16.500	6.623	Oct 2017	8.700	Oct 2018	4.453	Oct 2019	-		4.453	Continuing	Continuing	Continuing
CEC Increment 2	Various	Various : Various	0.237	1.253	Oct 2017	3.300	Oct 2018	1.818	Oct 2019	-		1.818	Continuing	Continuing	Continuing
Program Protection	C/BA	NSMA : Washington, DC	4.345	7.518	Oct 2017	8.527	Oct 2018	9.205	Oct 2019	-		9.205	Continuing	Continuing	Continuing
EASR	Various	Various : Various	0.000	2.238	Oct 2017	5.200	Oct 2018	7.452	Oct 2019	-		7.452	0.000	14.890	-
Crypto Modernization	Various	Various : Various	0.000	0.000		4.552	Oct 2018	0.000		-		0.000	0.000	4.552	-
Digital Warfare Tactical Networking Initiative Implementation	Various	Various : Various	0.000	0.000		17.900	Oct 2018	23.100	Oct 2019	-		23.100	0.000	41.000	-
FTIIP	Various	Various : Various	0.000	0.000		6.500	Oct 2018	0.000		-		0.000	0.000	6.500	-
Cyber Resiliency	Various	Various : Various	0.000	0.000		4.487	Oct 2018	1.452	Oct 2019	-		1.452	0.000	5.939	-
ELEKTRA	Various	Various : Various	0.000	0.000		0.000		1.520	Oct 2019	-		1.520	0.000	1.520	-
		Subtotal	587.312	67.627		117.485		98.571		-		98.571	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test/ACB Support	C/CPFF	Raytheon : St. Petersburg, FL	6.127	1.143	Oct 2017	1.379	Oct 2018	1.321	Oct 2019	-		1.321	Continuing	Continuing	Continuing
Test/ACB Support	C/CPFF	JHU/APL : Laurel, MD	3.734	1.651	Oct 2017	1.835	Oct 2018	1.777	Oct 2019	-		1.777	Continuing	Continuing	Continuing
Test Support	WR	NRL : Washington, DC	0.313	0.000		0.000		0.000		-		0.000	0.000	0.313	-
Test/ACB Support	WR	NSWC : Port Hueneme, CA	25.781	1.982	Oct 2017	2.163	Oct 2018	2.105	Oct 2019	-		2.105	Continuing	Continuing	Continuing
Air Operations Test Support	WR	NAVAIR (PMA207) : Patuxent River, MD	11.234	1.066	Oct 2017	1.247	Oct 2018	1.190	Oct 2019	-		1.190	Continuing	Continuing	Continuing
Test Data Reduction Analysis	WR	NSWC : Corona, CA	19.168	1.376	Oct 2017	1.641	Oct 2018	1.583	Oct 2019	-		1.583	Continuing	Continuing	Continuing
Test Support	WR	COMOPTEVFOR : Norfolk, VA	13.682	1.204	Oct 2017	1.452	Oct 2018	1.394	Oct 2019	-		1.394	Continuing	Continuing	Continuing
Test/ACB Support	WR	NSWC : Dahlgren, VA	3.568	1.423	Oct 2017	1.613	Oct 2018	1.555	Oct 2019	-		1.555	Continuing	Continuing	Continuing
		Subtotal	83.607	9.845		11.330		10.925		-		10.925	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/FFP	Booz Allen & Hamilton : Washington, DC	5.070	0.000		0.000		0.000		-		0.000	0.000	5.070	-
Program Management Support	C/FFP	Tech Marine : Washington, DC	0.360	0.000		0.000		0.000		-		0.000	0.000	0.360	-
		Subtotal	5.430	0.000		0.000		0.000		-		0.000	0.000	5.430	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	676.349	77.472		128.815		109.496		-		109.496	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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Fiscal Year	FY18				FY19				FY20				FY21				FY22				FY23				FY24			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestones	AS Approval Updated APB AP Approval				CSB/Gate 6 FY19		CDD Approval		CSB/Gate 6 FY20				CSB/Gate 6 FY21				CSB/Gate 6 FY22				CSB/Gate 6 FY23				CSB/Gate 6 FY24			
Program Milestones																												
CEC Enhanced Network (CEN)		SBR 18.1			SBR 18.3	SBR 19.1		SBR 19.2	SBR 19.3			SBR 20.2	SBR 20.3	SBR 21.1		SBR 21.2	SBR 21.3	SBR 22.1		SBR 22.2	SBR 22.3	FSBR						
CEC Technical Training CTT)	TIM	SBR 18.1		SBR 18.2	SBR 18.3																							
CEC Aegis Weapon System (AWS) ACB 20				TIM 18.2	TIM 18.3 Delta SRR	TIM 19.1	SFR	TIM 19.2	TIM 19.3	Delta SFR		SBR 20.2	SBR 20.3	SBR 21.1		SBR 21.2	FSBR											
Fire Control Loop Improvement Project (FCLIP)	FCLIP Ph 2 SBR 2			FCLIP Ph 2 SBR 18.2																								
CEC ELEKTRA															SRR			SFR		SBR 22.2	SBR 22.3	SBR 23.1		SBR 23.2	SBR 23.3	SBR 24.1		SBR 24.2
Enterprise Radar Suite		ERS/EASR SRR/SFR/SWBLR		SBT 18.2		SBT 19.1			SBT 19.3																			
CEC SSDS ACB 20							SRR			Delta SFR		SBR 20.2	SBR 20.3	SBR 21.1		SBR 21.2	SBR 21.3	FSBR										
Digital Warfare Tactical Networking Initiative Implementation					IPR 1			IPR 2			IPR 3			IPR 4		Demo											
CEC Sustainment			ILA Self Assessment		SSWG FY19		PSWG FY19		SSWG FY20		PSWG FY20		SSWG FY21		PSWG FY21		SSWG FY22		PSWGFY 22		SSWG FY23		PSWG FY23		SSWG FY24		PSWG FY24	
CEC Cyber						SBR 19.1		SBR 19.2	SBR 19.3			SBR 20.2	SBR 20.3	SBR 21.1		SBR 21.2	SBR 21.3	SBR 22.1		SBR 22.2	SBR 22.3	SBR 23.1						
CEC Far Term Interoperability Improvement Project (FTIIP)								SRR	CEC FTIIP FY20-FY23 efforts transition tonew 3240: CEC Increment II																			

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

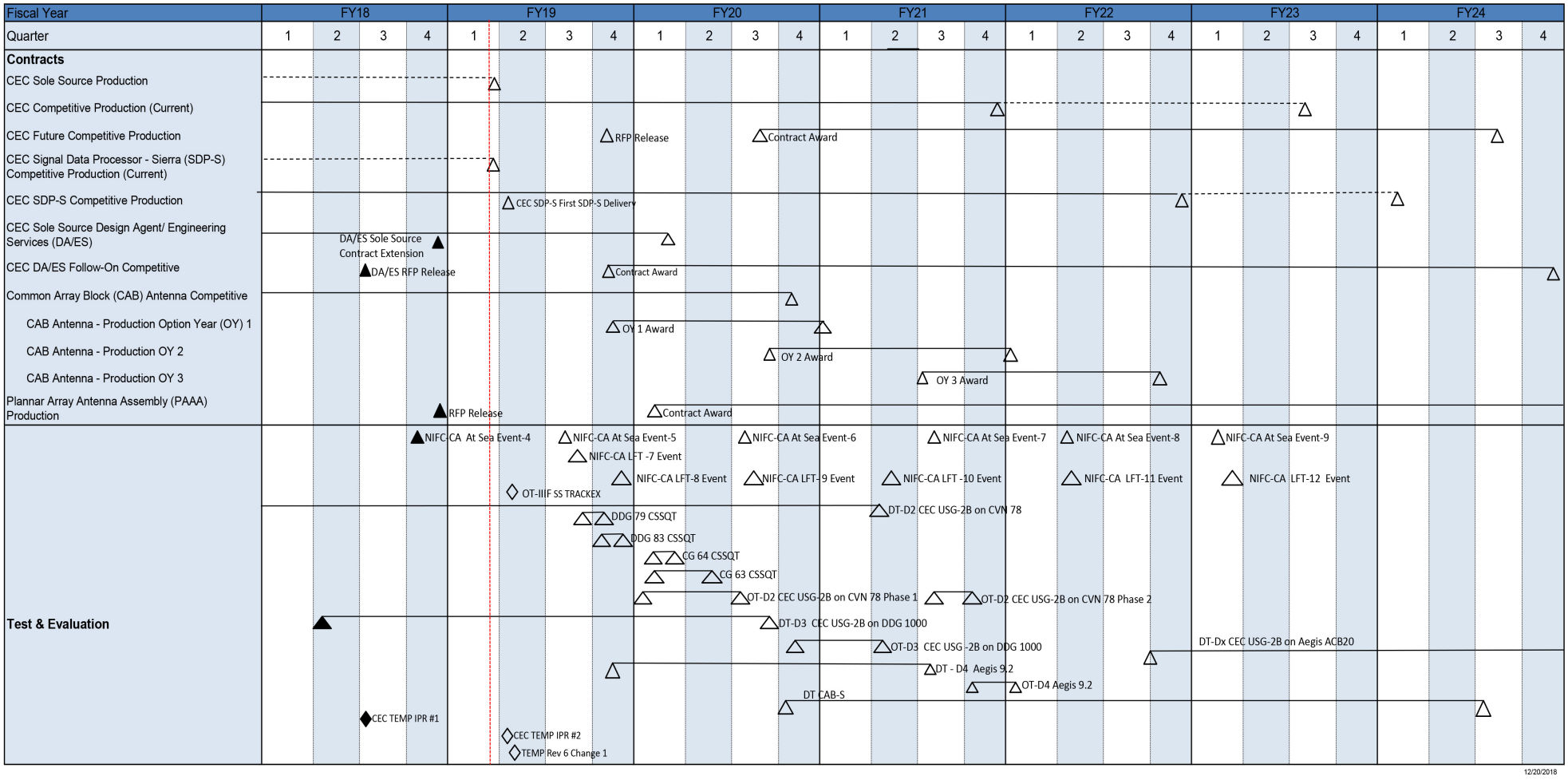

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

Legend

- Actual Milestone Completion
- Planned Milestone Completion
- Actual Event Start/Completion
- Planned Event Start/Completion
- Current Date
- Delivery Period based on Last Order Date

Acronym List

ACB: Advance Capability Build
AWS: Aegis Weapon System
AP: Acquisition Plan
AS: Acquisition Strategy
APB: Acquisition Program Baseline
CAB: Common Array Block
Common Array Block - Shipboard
CDD: Capability Development Document
CEC: Cooperative Engagement Capability
CEN: CEC Enhanced Network
CSSQT: Combat System Shipboard Qualification Trials
CTT: CEC Technical Training
DA/ES: Design Agent/Engineering Services
DT: Developmental Test
DWO: Digital Warfare Office
ERS: Enterprise Radar Suite
FCLIP: Fire Control Loop Improvement Project
FNC: Future Naval Capability
FOC: Full Operational Capability
FSBR: Final Software Build Review
FTIIP: Far Term Interoperability Improvement Project
FY: Fiscal Year
HS: Hypersonic
ILA: Independent Logistics Assessment
IPR: Internal Program Review
LFT: Live Fire Test
NIFC: Naval Integrated Fire Control
NIFC P: Naval Integrated Fire Control Passive
NIFC-CA: Naval Integrated Fire Control - Counter Air
NoGAPSS: Non-GPS Aided PNT (Position, Navigation and Timing) for Surface and Subsurface
OT: Operational Test
OY: Option Year
PAAA: Plannar Array Antenna Assembly
PDR: Preliminary Design Review
PH: Phase
PSWG: Product Support Working Group
RFP: Request For Proposal
SBR: Software Build Review
SBT: Sea Based Terminal
SDP-S: Signal Data Processor - Sierra
SFR: System Functional Review
SRR: System Requirements Review
SSDS: Ship Self Defense System
SS TRACKEX: Supersonic Tracking Exercise
SSWG: Supply Support Working Group
SWBLR: Software Baseline Review
TEMP: Test and Evaluation Master Plan
TIM: Technical Interchange Meeting
TRR: Technical Readiness Review

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2039				
CSB/Gate 6 FY19	1	2019	1	2019
CSB/Gate 6 FY20	1	2020	1	2020
CSB/Gate 6 FY21	1	2021	1	2021
CSB/Gate 6 FY22	1	2022	1	2022
CSB/Gate 6 FY23	1	2023	1	2023
CSB/Gate 6 FY24	1	2024	1	2024
Updated APB	1	2018	1	2018
AS Approved	1	2018	1	2018
AP Approved	3	2018	3	2018
CDD Approval	3	2019	3	2019
CEN SBR 18.1	2	2018	2	2018
CEN SBR 18.3	1	2019	1	2019
CEN SBR 19.1	2	2019	2	2019
CEN SBR 19.2	4	2019	4	2019
CEN SBR 19.3	1	2020	1	2020
CEN SBR 20.2	4	2020	4	2020
CEN SBR 20.3	1	2021	1	2021
CEN SBR 21.1	2	2021	2	2021
CEN SBR 21.2	4	2021	4	2021
CEN SBR 21.3	1	2022	1	2022
CEN SBR 22.1	2	2022	2	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CEN SBR 22.2	4	2022	4	2022
CEN SBR 22.3	1	2023	1	2023
CEN FSBR	2	2023	2	2023
CEC Technical Training TIM	1	2018	1	2018
CEC Technical Training SBR 18.1	2	2018	2	2018
CEC Technical Training SBR 18.2	4	2018	4	2018
CEC Technical Training SBR 18.3	1	2019	1	2019
CEC Aegis ACB 20 TIM 18.2	4	2018	4	2018
CEC Aegis ACB 20 Delta SRR	1	2019	1	2019
CEC Aegis ACB 20 TIM 18.3	1	2019	1	2019
CEC Aegis ACB 20 TIM 19.1	2	2019	2	2019
CEC Aegis ACB 20 SFR	3	2019	3	2019
CEC Aegis ACB 20 TIM 19.2	4	2019	4	2019
CEC Aegis ACB 20 TIM 19.3	1	2020	1	2020
CEC Aegis ACB 20 Delta SFR	2	2020	2	2020
CEC Aegis ACB 20 SBR 20.2	4	2020	4	2020
CEC Aegis ACB 20 SBR 20.3	1	2021	1	2021
CEC Aegis ACB 20 SBR 21.1	2	2021	2	2021
CEC Aegis ACB 20 SBR 21.2	4	2021	4	2021
CEC Aegis ACB 20 FSBR	1	2022	1	2022
CEC ELEKTRA SRR	3	2021	3	2021
CEC ELEKTRA SFR	2	2022	2	2022
CEC ELEKTRA SBR 22.2	4	2022	4	2022
CEC ELEKTRA SBR 22.3	1	2023	1	2023
CEC ELEKTRA SBR 23.1	2	2023	2	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CEC ELEKTRA SBR 23.2	4	2023	4	2023
CEC ELEKTRA SBR 23.3	1	2024	1	2024
CEC ELEKTRA SBR 24.1	2	2024	2	2024
CEC ELEKTRA SBR 24.2	4	2024	4	2024
FCLIP Ph 2 SBR 2	1	2018	1	2018
FCLIP Ph 2 SBR 18.2	4	2018	4	2018
CEC ERS/EASR SRR/SFR/SWBLR	2	2018	2	2018
CEC EASR SBT 18.2	4	2018	4	2018
CEC EASR SBT 19.1	2	2019	2	2019
CEC EASR SBT 19.3	1	2020	1	2020
CEC SSDS ACB 20 SRR	3	2019	3	2019
CEC SSDS ACB 20 Delta SFR	2	2020	2	2020
CEC SSDS ACB 20 SBR 20.2	4	2020	4	2020
CEC SSDS ACB 20 SBR 20.3	1	2021	1	2021
CEC SSDS ACB 20 SBR 21.1	2	2021	2	2021
CEC SSDS ACB 20 SBR 21.2	4	2021	4	2021
CEC SSDS ACB 20 SBR 21.3	1	2022	1	2022
CEC SSDS ACB 20 FSBR	2	2022	2	2022
DWO IPR 1	1	2019	1	2019
DWO IPR 2	4	2019	4	2019
DWO IPR 3	3	2020	3	2020
DWO IPR 4	2	2021	2	2021
DWO Demo	4	2021	4	2021
ILA Self Assessment	3	2018	3	2018
CEC Cyber SBR 19.1	2	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CEC Cyber SBR 19.2	4	2019	4	2019
CEC Cyber SBR 19.3	1	2020	1	2020
CEC Cyber SBR 20.2	4	2020	4	2020
CEC Cyber SBR 20.3	1	2021	1	2021
CEC Cyber SBR 21.1	2	2021	2	2021
CEC Cyber SBR 21.2	4	2021	4	2021
CEC Cyber SBR 22.1	2	2022	2	2022
CEC Cyber SBR 22.2	4	2022	4	2022
CEC Cyber SBR 22.3	1	2023	1	2023
CEC Cyber SBR 23.1	2	2023	2	2023
CEC FTIIP SRR	4	2019	4	2019
CEC Sole Source Production	1	2018	1	2019
CEC Competitive Production (Current)	2	2018	3	2023
RFP Release-CEC Future Competitive Production	4	2019	4	2019
CEC Future Competitive Production	3	2020	3	2024
CEC SDP-S Competitive Production (Current)	1	2018	1	2019
CEC SDP-S Competitive Production	1	2018	1	2024
CEC SDP-S First SDP-S Delivery	2	2019	2	2019
CEC Sole Source DA/ES	1	2018	1	2020
DA/ES RFP Release	3	2018	3	2018
CEC DA/ES Follow-On Competitive	4	2019	4	2024
CAB Antenna Competitive	1	2018	4	2020
NIFC-CA At Sea Event-4	4	2018	4	2018
NIFC-CA At Sea Event-5	3	2019	3	2019
NIFC-CA At Sea Event-6	3	2020	3	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
NIFC-CA At Sea Event-7	3	2021	3	2021
NIFC-CA At Sea Event-8	2	2022	2	2022
NIFC-CA At Sea Event-9	1	2023	1	2023
NIFC-CA LFT-7 Event	3	2019	3	2019
NIFC-CA LFT-8 Event	4	2019	4	2019
NIFC-CA LFT-9 Event	3	2020	3	2020
NIFC-CA LFT-10 Event	2	2021	2	2021
NIFC-CA LFT-11 Event	2	2022	2	2022
NIFC-CA LFT-12 Event	1	2023	1	2023
OT-IIF Supersonic Trackex (SS TRX)	2	2019	2	2019
DT-D2 CEC USG-2B on CVN 78	1	2018	2	2021
OT-D2 CEC USG-2B on CVN 78 Phase 1	1	2020	3	2020
OT-D2 CEC USG-2B on CVN 78 Phase 2	3	2021	4	2021
TEMP Rev 6 Chg 1	2	2019	2	2019
DT-D3-CEC USG-2B on DDG 1000	2	2018	3	2020
OT-D3 USG-2B on DDG 1000	4	2020	2	2021
DT-Dx CEC USG-2B on Aegis ACB 20	4	2022	4	2024
DT-D4 Aegis 9.2	4	2019	3	2021
OT-D4 Aegis 9.2	4	2021	1	2022
DT CAB-S	4	2020	3	2024
CAB Antenna - Production Option Year (OY) 1	4	2019	1	2021
CAB Antenna - Production OY 2	3	2020	1	2022
CAB Antenna - Production OY 3	3	2021	4	2022
CEC TEMP IPR #1	3	2018	3	2018
CEC TEMP IPR #2	2	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 2039 / *COOP Engagement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
DDG 79 CSSQT	3	2019	4	2019
DDG 83 CSSQT	4	2019	4	2019
CG 64 CSSQT	1	2020	1	2020
CG 63 CSSQT	1	2020	2	2020
PAAA Production	1	2020	4	2024
CEC Cyber SBR 21.3	1	2022	1	2022
SSWG FY19	1	2019	1	2019
PSWG FY19	3	2019	3	2019
SSWG FY20	1	2020	1	2020
PSWG FY20	3	2020	3	2020
SSWG FY21	1	2021	1	2021
PSWG FY21	3	2021	3	2021
SSWG FY22	1	2022	1	2022
PSWG FY22	3	2022	3	2022
SSWG FY23	1	2023	1	2023
PSWG FY23	3	2023	3	2023
SSWG FY24	1	2024	1	2024
PSWG FY24	3	2024	3	2024
PAAA RFP Release	4	2018	4	2018
CEC TEMP Rev 6 Change 1	2	2019	2	2019
DA/ES Sole Source Contract Extension	4	2018	4	2018

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / *(U)Cooperative Engagement Capability*	Project (Number/Name) 3240 / *CEC Increment II*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3240: *CEC Increment II*	0.000	0.000	0.000	18.428	-	18.428	36.297	44.049	32.917	35.248	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

FY 2020 funding of $18.428 million for CEC Increment II efforts was realigned from Project 2039 to to a new project code 3240. This is not a new start.

A. Mission Description and Budget Item Justification

CEC Capability Development Document (CDD) Increment II evolves Increment I capabilities by enhancing the current naval air defense and sensor network system capabilities through the expansion of network capacity as well as extension into other warfare mission domains. CEC CDD Increment 2 shall integrate new sensor types and track data sources into the network, such as surface search radars and passive detection sensors, as well as relevant data from other networks. CEC CDD Increment II shall accommodate more CUs and provide a more complete, robust, and resilient situational awareness picture, composite identification, and Integrated Fire Control (IFC), with assured communications for Integrated Air and Missile Defense (IAMD), surface warfare, and electronic mission warfare domains.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: CEC FAR-TERM INTEROPERABILITY IMPROVEMENT PROJECT (FTIIP) ***Articles:***	0.000 -	0.000 -	6.600 -	0.000 -	6.600 -
FY 2019 Plans: FY2019 Plans are identified under PE 0607658N / (U)Cooperative Engagement Capability Project 2039 / COOP Engagement. ***FY 2020 Base Plans:*** Continue development of CEC integration with Identification Friend or Foe (IFF) Mode S and Automatic Dependent Surveillance - Broadcast (ADS-B) systems. Continue system of system coordination with Aegis, SSDS, E-2D, and USMC CAC2S to ensure proper functional allocation across the system of systems. Conduct System Functional Review (SFR). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** CEC FTIIP efforts transition from PE 0607658N / Cooperative Engagement Capability Project 2039 to PE 0607658N/ Cooperative Engagement Capability Project 3240 / CEC CDD Increment II in FY20.					
Title: NIFC HYPERSONIC	0.000	0.000	1.620	0.000	1.620

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 3240 / *CEC Increment II*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** Begin initial Requirements Development by conducting analysis against threats of interest to inform CEC and systems of systems design factors. In close coordination with Missile Defense Agency (MDA) and USN Programs of Record, conduct Modeling and Simulation and Systems Integration Lab (SIL) Demo to refine understanding and shape Concepts of Employment (CONEMPS). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase is due to start of development in FY 2020.					
Title: CRYPTO MODERNIZATION	0.000	0.000	5.748	0.000	5.748
Articles:	-	-	-	-	-
FY 2019 Plans: FY2019 Plans are identified under PE 0607658N / (U)Cooperative Engagement Capability Project 2039 / COOP Engagement. ***FY 2020 Base Plans:*** Continue cryptographic modernization effort for Signal Data Processor. Complete System Functional Review (SFR) and conduct Preliminary Design. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** CEC Crypto Modernization efforts transition from PE 0607658N / (U)Cooperative Engagement Capability Project 2039 to PE 0607658N / (U)Cooperative Engagement Capability Project 3240 / CEC Increment II in FY20.					
Title: NIFC Passive	0.000	0.000	4.460	0.000	4.460
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 3240 / *CEC Increment II*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** In Close Coordination with IWS 2 and PMA 231, begin integration effort for new Electronic Surveillance (ES) sensors to enable advanced passive features, completing initial Modeling and Simulation (M&S) to refine concepts and inform requirements. Complete element level System Requirement Review (SRR). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase is due to start of development in FY 2020.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	18.428	0.000	18.428

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The CEC Increment II Acquisition Strategy (AS) is covered under the Cooperative Engagement Capability / COOP Engagement Project 2039 Acquisition Strategy (AS). Approval of the CEC Increment II Capability Development Document (CDD) is expected in FY19.

E. Performance Metrics

The CEC Increment II Performance Metrics are covered under the Cooperative Engagement Capability / COOP Engagement Project 2039 Performance Metrics.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 3240 / *CEC Increment II*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Crypto Modernization	Various	Various : Not Specified	0.000	0.000		0.000		5.748	Oct 2019	-		5.748	Continuing	Continuing	Continuing
FTIIP	Various	Various : Not Specified	0.000	0.000		0.000		6.600	Oct 2019	-		6.600	Continuing	Continuing	Continuing
NIFC Hypersonic	Various	Various : Not Specified	0.000	0.000		0.000		1.620	Oct 2019	-		1.620	Continuing	Continuing	Continuing
NIFC Passive	Various	Various : Not Specified	0.000	0.000		0.000		4.460	Oct 2019	-		4.460	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		18.428		-		18.428	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		18.428		-		18.428	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 3240 / *CEC Increment II*

Fiscal Year	FY18				FY19				FY20				FY21				FY22				FY23				FY24			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acquisition Milestones							◇ Navy Gate 3/R3B ◇ CEC Increment II Approval			◇ MS B														◇ MS C				
Program Milestones																												
CEC Far Term Interoperability Improvement Project (FTIIP)											◇ SFR		◇ SBR 20.3	◇ SBR 21.1		◇ SBR 21.2	◇ SBR 21.3	◇ SBR 22.1		◇ SBR 22.2	◇ SBR 22.3	◇ FSBR						
Naval Integrated Fire Control Passive (NIFC P)														◇ SRR		◇ SFR	◇ SBR 21.3	◇ SBR 22.1		◇ SBR 22.2	◇ SBR 22.3	◇ SBR 23.1		◇ SBR 23.2	◇ SBR 23.3	◇ SBR 24.1		◇ FSBR
CEC Naval Integrated Fire Control (NIFC) Hypersonic (HS)													◇ SRR				◇ SFR	◇ SBR 22.1		◇ SBR 22.2	◇ SBR 22.3	◇ SBR 23.1		◇ SBR 23.2	◇ SBR 23.3	◇ SBR 24.1		◇ SBR 24.2

12/20/2018

Legend

- Actual Milestone Completion
- Planned Milestone Completion
- Actual Event Start/Completion
- Planned Event Start/Completion
- Current Date
- Delivery Period based on Last Order Date

Acronym List

CDD: Capability Development Document
CEC: Cooperative Engagement Capability
DA/ES: Design Agent/Engineering Services
FTIIP: Far Term Interoperability Improvement Project
FY: Fiscal Year
HS: Hypersonic
NIFC: Naval Integrated Fire Control
NIFC P: Naval Integrated Fire Control Passive
NIFC-HS: Naval Integrated Fire Control - Hypersonic
R3B: Resources and Requirements Review Board
RFP: Request For Proposal
SBR: Software Build Review
SFR: System Functional Review
SRR: System Requirements Review

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 3240 / *CEC Increment II*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3240				
Navy Gate 3/R3B	3	2019	3	2019
CEC Increment II Approval	3	2019	3	2019
MS B	2	2020	2	2020
MS C	4	2023	4	2023
CEC FTIIP SFR	3	2020	3	2020
CEC FTIIP SBR 20.3	1	2021	1	2021
CEC FTIIP SBR 21.1	2	2021	2	2021
CEC FTIIP SBR 21.2	4	2021	4	2021
CEC FTIIP SBR 21.3	1	2022	1	2022
CEC FTIIP SBR 22.1	2	2022	2	2022
CEC FTIIP SBR 22.2	4	2022	4	2022
CEC FTIIP SBR 22.3	1	2023	1	2023
CEC FTIIP FSBR	2	2023	2	2023
NIFC Passive SRR	2	2021	2	2021
NIFC Passive SFR	4	2021	4	2021
NIFC Passive SBR 21.3	1	2022	1	2022
NIFC Passive SBR 22.1	2	2022	2	2022
NIFC Passive SBR 22.2	4	2022	4	2022
NIFC Passive SBR 22.3	1	2023	1	2023
NIFC Passive SBR 23.1	2	2023	2	2023
NIFC Passive SBR 23.2	4	2023	4	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 3240 / *CEC Increment II*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
NIFC Passive SBR 23.3	1	2024	1	2024
NIFC Passive SBR 24.1	2	2024	2	2024
NIFC Passive FSBR	4	2024	4	2024
CEC NIFC Hypersonic SRR	1	2021	1	2021
CEC NIFC Hypersonic SFR	1	2022	1	2022
CEC NIFC Hypersonic SBR 22.1	2	2022	2	2022
CEC NIFC Hypersonic SBR 22.2	4	2022	4	2022
CEC NIFC Hypersonic SBR 22.3	1	2023	1	2023
CEC NIFC Hypersonic SBR 23.1	2	2023	2	2023
CEC NIFC Hypersonic SBR 23.2	4	2023	4	2023
CEC NIFC Hypersonic SBR 23.3	1	2024	4	2024
CEC NIFC Hypersonic SBR 24.1	2	2024	2	2024
CEC NIFC Hypersonic SBR 24.2	4	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607658N / *(U)Cooperative Engagement Capability*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	10.616	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.616
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

CEC integrates Identification Friend Foe (IFF) Mode 4 and 5 information and distributes that information within the CEC network for improved tracking, Composite Identification, and Combat Identification. Fleet operational requirements necessitate acceleration of IFF Mode 5 improvements within CEC that include software corrections to existing functionality as well as IFF integration design improvements for all CEC configurations that support IFF Mode 5 including E-2D Delta System Software Configuration version (DSSC) 3, Aegis Weapon System Baseline 7.2 and above, and Ship Self Defense System SSDS) Mk 2 Build 10 and above.

In addition, acceleration of IFF Mode 5 integration with multiple combat system configurations is required including Ship Self Defense System (SSDS) Mk 2 Builds 6 and 9. For these configurations, IFF Mode 5 functionality will be added to CEC and SSDS prior to originally planned SSDS and CEC modernization schedules.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: CEC Identification Friend or Foe (IFF) Mode 5 Acceleration	10.616	0.000
FY 2018 Accomplishments: Completed development, integration, test and certification of critical IFF Mode 5 related software trouble report corrections for AWS BL 7.2, 9.2.0 and SSDS Build 9 configurations. Completed development and integration of IFF processing design changes to improve the overall performance of IFF processing including IFF M5. Initiated development of CEC software builds for SSDS Builds 9 and 6 to enable IFF Mode 5 functionality within CEC (including the IFF Mode 5 software trouble report corrections and IFF processing design improvements) ahead of combat system modernization. Completed element certification of IFF Mode 5 software trouble report corrections with IFF processing design changes for SSDS Build 11 on CVN 78.		
FY 2019 Plans: Will complete development, integration, test, and certification of CEC software builds for SSDS Builds 9 and 6 to enable IFF Mode 5 functionality within CEC (including the IFF Mode 5 software trouble report corrections and IFF processing design improvements) ahead of combat system modernization. Will complete development, integration, test, and certification of CEC software builds for AEGIS BL 7.2.3 and 9A2A (including the IFF Mode 5 software trouble report corrections and IFF processing design improvements). Conduct Software Build Review (SBR) 18.3 and Final SBR (FSBR).		
Congressional Adds Subtotals	10.616	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 9999 / *Congressional Adds*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IFF Mode 5 Acceleration	C/CPFF	Raytheon : St Petersburg, FL	0.000	9.327	Jun 2018	0.000		0.000		-		0.000	0.000	9.327	-
IFF Mode 5 Acceleration	WR	NSWC : Dahlgren, VA	0.000	0.792	Jun 2018	0.000		0.000		-		0.000	0.000	0.792	-
IFF Mode 5 Acceleration	WR	NSWC : Port Hueneme, CA	0.000	0.220	Jun 2018	0.000		0.000		-		0.000	0.000	0.220	-
IFF Mode 5 Acceleration	WR	NSWC : Crane, IN	0.000	0.055	Jun 2018	0.000		0.000		-		0.000	0.000	0.055	-
IFF Mode 5 Acceleration	C/CPFF	JHU/APL : Laurel, MD	0.000	0.222	Jun 2018	0.000		0.000		-		0.000	0.000	0.222	-
		Subtotal	0.000	10.616		0.000		0.000		-		0.000	0.000	10.616	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	10.616		0.000		0.000		-		0.000	0.000	10.616	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 9999 / *Congressional Adds*

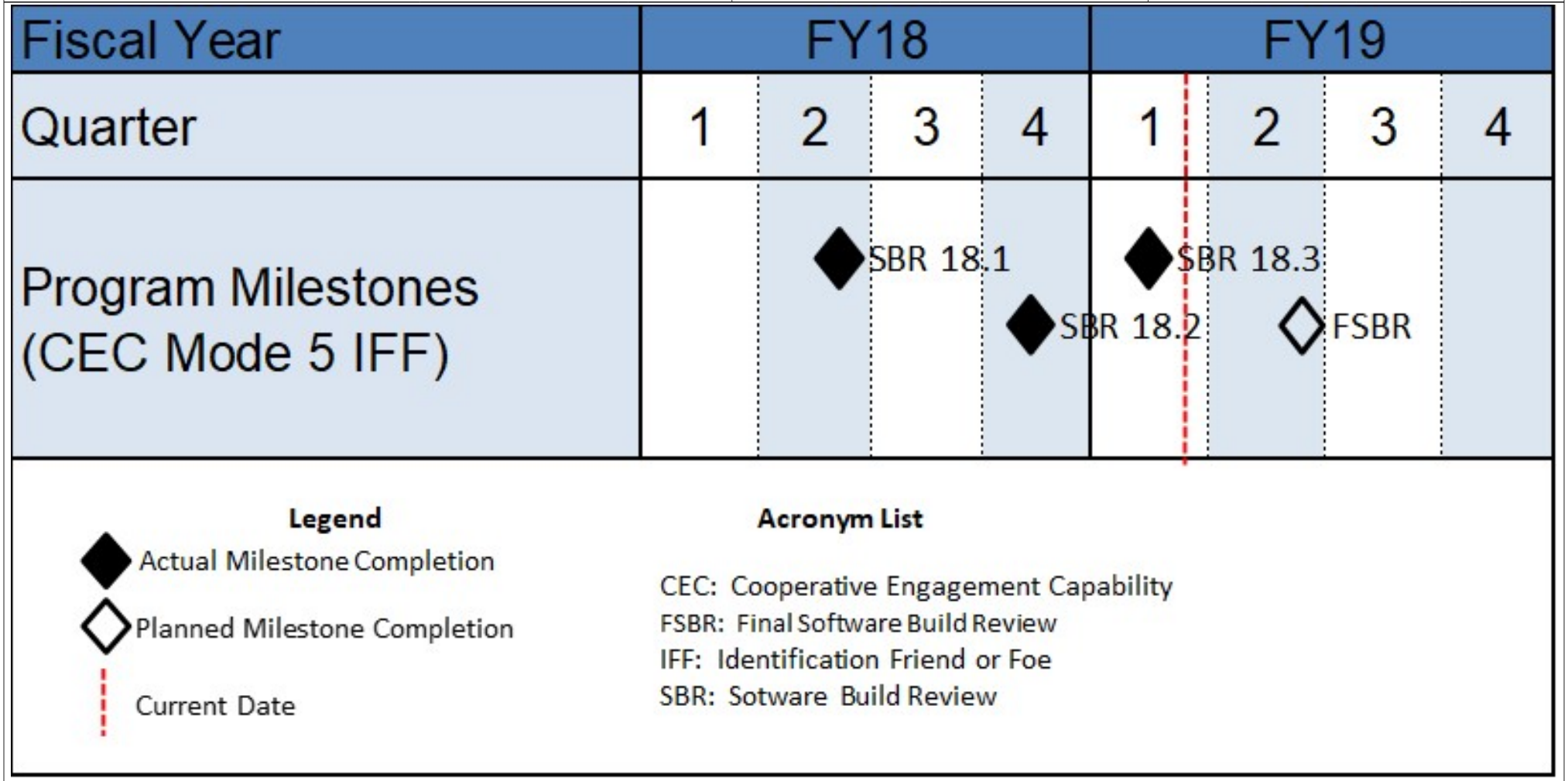

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607658N / *(U)Cooperative Engagement Capability*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
CEC IFF Mode 5 SBR 18.1	2	2018	2	2018
CEC IFF Mode 5 SBR 18.2	4	2018	4	2018
CEC IFF Mode 5 SBR 18.3	1	2019	1	2019
CEC IFF Mode 5 FSBR	2	2019	2	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607700N *I (U)Deployable Joint Command and Control*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	2.834	3.093	3.127	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.054
3050: *Deployable JT Command and Control*	2.834	3.093	3.127	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.054

Note

Funding for the following project has been realigned out of PE 0607700N into PE 0604231N as part of Program Element Consolidation starting in FY20: Project 3050 (Deployable JT Command and Control.

A. Mission Description and Budget Item Justification

Deployable Joint Command and Control (DJC2) provides a self-contained, standardized, rapidly deployable, modular, scalable, and reconfigurable joint command and control (C2) capability to designated Geographic Combatant Commands (GCCs). DJC2 is the materiel solution to Defense Planning Guidance that called for the development of standing Joint Task Forces (JTFs) with a deployable C2 capability. DJC2 will ensure that Joint Force Commanders (JFC) are equipped, as well as trained and organized, to carry out their C2 responsibilities. DJC2 provides GCCs and JFCs a mission critical, integrated family of systems with which to plan, control, coordinate, execute, and assess operations. It is designed to deploy rapidly, set up within hours, and quickly provide necessary C2 mission and collaboration functionality across the full spectrum of JTF operations. The DJC2 has also been deployed in support of Humanitarian Assistance and Disaster Relief (HA/DR) efforts. The capability is intended for all levels of conflict and will be reconfigurable to meet specific GCC and JTF mission requirements. This capability is interoperable with higher and adjacent echelons of command (to include coalition allies) as well as with supporting elements to include joint forces.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	3.137	3.127	3.161	-	3.161
Current President's Budget	3.093	3.127	0.000	-	0.000
Total Adjustments	-0.044	0.000	-3.161	-	-3.161
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.044	0.000			
• Rate/Misc Adjustments	0.000	0.000	-3.161	-	-3.161

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607700N / *(U)Deployable Joint Command and Control*	Project (Number/Name) 3050 / *Deployable JT Command and Control*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3050: *Deployable JT Command and Control*	2.834	3.093	3.127	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.054
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Deployable Joint Command and Control (DJC2) provides a self-contained, standardized, rapidly deployable, modular, scalable, and reconfigurable joint command and control (C2) capability to designated Geographic Combatant Commands (GCCs). DJC2 is the materiel solution to Defense Planning Guidance that called for the development of standing Joint Task Forces (JTFs) with a deployable C2 capability. DJC2 will ensure that Joint Force Commanders (JFC) are equipped, as well as trained and organized, to carry out their C2 responsibilities. DJC2 provides GCCs and JFCs a mission critical, integrated family of systems with which to plan, control, coordinate, execute, and assess operations. It is designed to deploy rapidly, set up within hours, and quickly provide necessary C2 mission and collaboration functionality across the full spectrum of JTF operations. The DJC2 has also been deployed in support of Humanitarian Assistance and Disaster Relief (HA/DR) efforts. The capability is intended for all levels of conflict and will be reconfigurable to meet specific GCC and JTF mission requirements. This capability is interoperable with higher and adjacent echelons of command (to include coalition allies) as well as with supporting elements to include joint forces. Note that DJC2 is not a follow-on or replacement system for the Joint Global Command and Control Systems (GCCS-J); rather, DJC2 employs a GCCS in its suite of applications, ensuring interoperability with the worldwide-installed base of GCCS-J.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Systems Engineering & Integration	1.308	1.398	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: Continue to develop system enhancements in support of Information Assurance, Assured Command & Control, Common Expeditionary and Shore Baseline (CESB) Enhancement / migration to a common infrastructure and C2ISR application baseline. Align common system architecture with Joint Information Environment (JIE) and Tactical Packet Network (TPN) supporting leverage of common capabilities. Initiate enclave consolidation leveraging data tagging and tagged authorization and authentication for enclave access. Enhance satellite communication Unified Net centric System Modernizing Teleport Step Sites and disconnected, intermittent and latent available cloud capabilities.					
FY 2020 Base Plans: FY20 funding has been realigned to PE 0604231N Project 3050 as part of PE Consolidation.					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607700N / *(U)Deployable Joint Command and Control*	**Project (Number/Name)** 3050 / *Deployable JT Command and Control*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0604231N Project 3050. There are no significant changes to the request from FY19 to FY20.					
Title: DJC2 RDT&E Test Bed	1.785	1.729	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: Continue testing in support of enhanced Information Assurance to include Automated Cyber Security testing, automated system vulnerability patching download, and system microsegmentation. Demonstrate Cloud Service Automated Patching/Cloud services and Commercial Solution for Classified Multi-Tenant Environment Replacing Type 1 Encryption. Refine and test Disconnected, Interrupted, and Low-bandwidth (DIL) tolerant access to support automated system patching, as-needed remote system access, automated system download from in-garrison cloud, and re-synch with cloud after deployment. ***FY 2020 Base Plans:*** FY20 funding has been realigned to PE 0604231N Project 3050 as part of PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0604231N Project 3050. There are no significant changes to the request from FY19 to FY20.					
Accomplishments/Planned Programs Subtotals	3.093	3.127	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN /2906: *DJC2*	40.079	42.010	36.226	-	36.226	29.230	29.576	30.152	30.754	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607700N / *(U)Deployable Joint Command and Control*	**Project (Number/Name)** 3050 / *Deployable JT Command and Control*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

Funding for FY20-FY24 has been realigned to PE 0604231N Project 3050 as part of PE Consolidation.

D. Acquisition Strategy

This RDT&E line supports an evolutionary acquisition strategy. The intent of this strategy is to: develop a system based upon a current understanding of joint requirements; rapidly field systems based upon those requirements; analyze operational utilization of the systems; and roll the results of the analysis into periodic upgrades of the systems to maintain currency and maximize operational effectiveness. Efforts include investigation of emerging technologies through study, development, and associated testing for feasibility of program insertion. The baseline configuration is based upon existing Command, Control, Communications, Computers, & Intelligence (C4I) systems, scaled to the Combatant Command level. The follow-on configurations will include newly developed capabilities based on emergent, joint requirements and operational feedback based upon utilization of earlier delivered systems. Ultimately, the goal is to perform quick and affordable integration of emergent transformational COTS and GOTS technologies in support of information warfare and overall efforts required to pace the threat. This is accomplished via technical analyses and engineering efforts associated with implementation of new technology to enable rapid introduction of new products and technology, prevent obsolescence, and end of support issues enhancements via incremental software & hardware upgrades delivered on annual build release

E. Performance Metrics

The Deployable Joint Command and Control (DJC2) program continues to identify, evaluate and test a minimum of 3 - 5 new technologies per year based on emergent / joint requirements for potential insertion into the DJC2 system upgrade plan.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607700N / *(U)Deployable Joint Command and Control*	Project (Number/Name) 3050 / *Deployable JT Command and Control*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NSWC : PCD	0.685	0.727	Dec 2017	0.734	Dec 2018	0.000		-		0.000	0.000	2.146	-
Hardware/Software Development	C/CPAF	GTRI : ATLANTA, GA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	0.685	0.727		0.734		0.000		-		0.000	0.000	2.146	N/A

Remarks

FY20 cost data is provided under PE 0604231N Project 3050.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Integration	WR	NSWC : PCD	0.347	0.404	Dec 2017	0.404	Dec 2018	0.000		-		0.000	0.000	1.155	-
		Subtotal	0.347	0.404		0.404		0.000		-		0.000	0.000	1.155	N/A

Remarks

FY20 cost data is provided under PE 0604231N Project 3050.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC : PCD	0.800	0.810	Dec 2017	0.885	Dec 2018	0.000		-		0.000	0.000	2.495	-
Operational Test & Evaluation	WR	NSWC : PCD	0.814	0.964	Dec 2017	0.934	Dec 2018	0.000		-		0.000	0.000	2.712	-
		Subtotal	1.614	1.774		1.819		0.000		-		0.000	0.000	5.207	N/A

Remarks

FY20 cost data is provided under PE 0604231N Project 3050.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0607700N / *(U)Deployable Joint Command and Control*	Project (Number/Name) 3050 / *Deployable JT Command and Control*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	SSC PAC : San Diego, CA	0.188	0.188	Dec 2017	0.170	Dec 2018	0.000		-		0.000	0.000	0.546	-
		Subtotal	0.188	0.188		0.170		0.000		-		0.000	0.000	0.546	N/A

Remarks

FY20 cost data is provided under PE 0604231N Project 3050.

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.834	3.093		3.127		0.000		-		0.000	0.000	9.054	N/A

Remarks

FY20 cost data is provided under PE 0604231N Project 3050.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607700N / *(U)Deployable Joint Command and Control*	**Project (Number/Name)** 3050 / *Deployable JT Command and Control*

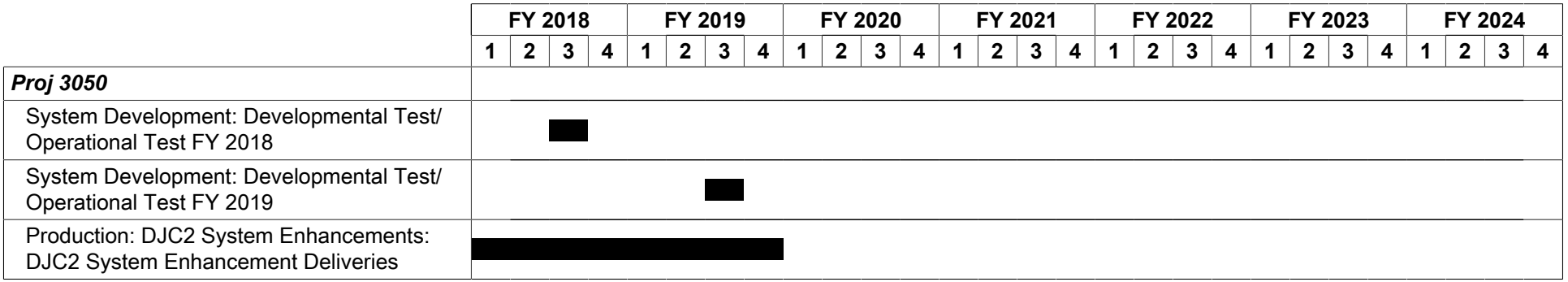


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0607700N / *(U)Deployable Joint Command and Control*	**Project (Number/Name)** 3050 / *Deployable JT Command and Control*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3050				
System Development: Developmental Test/Operational Test FY 2018	3	2018	3	2018
System Development: Developmental Test/Operational Test FY 2019	3	2019	3	2019
Production: DJC2 System Enhancements: DJC2 System Enhancement Deliveries	1	2018	4	2019

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0101221N *I Strategic Sub & Wpns Sys Supt*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	1,192.668	130.652	148.379	157.676	-	157.676	152.942	139.404	163.953	167.228	Continuing	Continuing
0951: *Joint Warhead Fuze Sustainment Program*	504.114	108.199	62.203	23.226	-	23.226	25.100	2.227	0.000	0.000	0.000	725.069
2021: *Mk4A Shape Stable Nose Tip*	0.000	5.771	27.169	22.820	-	22.820	13.990	7.408	5.892	6.007	Continuing	Continuing
2228: *Technical Applications Programs*	659.458	6.977	14.509	82.783	-	82.783	110.933	126.787	155.020	158.119	Continuing	Continuing
3097: *W78/88-1 Life Extension Program*	0.000	0.000	24.000	26.000	-	26.000	0.000	0.000	0.000	0.000	0.000	50.000
3158: *Integrated Nuclear Weapons Security Sys Dev*	29.096	2.726	2.798	2.847	-	2.847	2.919	2.982	3.041	3.102	Continuing	Continuing
9999: *Congressional Adds*	0.000	6.979	17.700	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	24.679
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 178												

A. Mission Description and Budget Item Justification

The Joint Warhead Fuze Sustainment Program (0951) is an effort to develop advanced components to improve the reliability, safety, and security of Arming, Fuzing and Firing (AF&F) systems for nuclear reentry systems. The current effort is focused on supporting the alteration of the AF&F system for the MK5/W88 system which will be five years beyond its design life at the scheduled deployment of the AF&F alteration. This effort also supports future utilization of the developed components by the US Air Force and United Kingdom.

The Mk4A Shape Stable Nose Tip (SSNT) (2021) effort will convert reentry body (RB) forward shell assemblies (FSA's) from legacy carbon composite nose tips to SSNT's. This will require ground and flight testing of SSNT RBA's, updates and modifications to RB documentation (Weapon Specifications, Interface Control Drawings, product drawings etc), updated Fire Control software for fleet implementation, conversion of war reserve RB's to FSA's with SSNT, procurement/conversion of surveillance and flight test units, Strategic Weapons Facility (SWF) logistics implementation planning and execution, review and update Mk4A surveillance planning and the DoD share of National Nuclear Security Administration (NNSA) Office of Secure Transportation (OST) for shipping.

The Technology Applications Program (2228) supports the TRIDENT II (D5) Submarine Launched Ballistic Missile (SLBM) that provides the U.S. a weapon system with greater accuracy and payload capability as compared to the TRIDENT I (C4) system. TRIDENT II enhances U.S. strategic deterrence providing a survivable, sea-based system capable of engaging the full spectrum of potential targets with fewer submarines. The Multi Star Enhanced Prelaunch (MEP) project leverages the capability of the D5 Life Extension Guidance (Mk6 Mod1) to sight two stars vice one combined with the interface updates to the Fire Control and Navigation subsystem,

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0101221N *I Strategic Sub & Wpns Sys Supt*

allowing for in-flight correction, the potential to operate in environments where GPS is denied, and may provide future relief to the strict tolerance requirements of the strategic navigator on the current OHIO class submarines and the COLUMBIA program. The Systems Engineering Modeling and Simulation capability will consist of three elements: Model Based Design, Strategic Weapon System (SWS) Integrated Modeling and Simulation/Common Architecture & Framework, and SWS Enhancement Ground Test. This effort will provide the capability to comprehensively evaluate and test the integrated SWS within representative operational environments, providing unprecedented visibility across the SWS and system performance characterization equivalent to flight testing. This capability will enable trade space analysis to identify technical margin, subsystem interactions, and lifecycle affordability opportunities to include other services and be able to identify the benefits and risks of commonality to the individual programs, requirements and CONOPs modifications that could facilitate commonality, potential common acquisition strategies between the services, and total life cycle cost implications. Starting in FY 2020 this project will begin development for D5 Life Extension D5LE2. The D5LE2 will include System Level Architecture Trades and Design Processes in which initial planning and system technology trade studies are necessary to begin preparing for D5LE2. Investments are required starting in FY20 to begin trading system architecture concepts and implementing modern model based design and system engineering practices. D5LE2 Avionics Architecture & Technology Development will include legacy D5 and D5LE electronic technologies now obsolete and manufacturing lines shutdown. Avionics architectures, sensor, bus and component designs are inherently complex with design and manufacturing technologies continuously evolving. Technology advancements and improved system architecture concepts have the potential to improve system capability, modularity, manufacturability, SWS operations and sustainability.

The 3097 RDTEN project will evaluate and down-select of a range of options to meet USSTRATCOM requirements for a future Navy warhead variant. In FY20, the study will enter Phase 6.2 to further refine the down-selected concepts, screening criteria and programmatic tradeoffs (e.g., cost, schedule, technical maturity) for the concepts being considered.

The Integrated Nuclear Weapons Security System (INWSS) (3158) efforts support the Nuclear Weapons Security program and SSBN Escort mission. The policies and requirements regarding the safeguard of nuclear weapons within the Department of Defense is established by DoD S5210.41M. Within the Department of the Navy, nuclear weapons are limited to TRIDENT Fleet Ballistic Missiles (FBM), either deployed aboard TRIDENT submarines or located landside at Naval Submarine Base, Kings Bay, or Naval Submarine Base, Bangor where missiles are first assembled as well as repaired. The Chief of Naval Operations (CNO) has assigned the Strategic Systems Programs (SSP), the FBM program manager, with mission responsibility for the safeguard of FBM nuclear technologies. This budget supports efforts directed at improving the current technological baseline through a series of studies. These efforts will improve countermeasure technologies to address detection, delay and denial.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0101221N *I Strategic Sub & Wpns Sys Supt*		
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	135.219	157.679	141.154	-	141.154
Current President's Budget	130.652	148.379	157.676	-	157.676
Total Adjustments	-4.567	-9.300	16.522	-	16.522
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-27.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	17.700			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.869	0.000			
• Program Adjustments	0.000	0.000	16.722	-	16.722
• Rate/Misc Adjustments	-0.001	0.000	-0.200	-	-0.200
• Congressional Directed Reductions Adjustments	-9.697	-	-	-	-
• Congressional Add Adjustments	7.000	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2018**	**FY 2019**
Project: 9999: *Congressional Adds*		
Congressional Add: *Program Increase*	6.979	0.000
Congressional Add: *Model Based Systems Engineering*	0.000	15.000
Congressional Add: *Autonomous Strategic Force Protection Sensor Network*	0.000	2.700
Congressional Add Subtotals for Project: 9999	6.979	17.700
Congressional Add Totals for all Projects	6.979	17.700

Change Summary Explanation

The FY2020 funding request was reduced by $9.278M to account for the availability of prior year execution balances.

Interoperable Warhead (W78/88-1 Life Extension Program) was reduced in FY19 due to executability and was rephrased into FY20.

FY20 begins D5 Life Extension (D5LE2). The D5LE2 will include System Level Architecture Trades and Design Processes in which initial planning and system technology trade studies are necessary to begin preparing for D5LE2.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*				Project (Number/Name) 0951 / *Joint Warhead Fuze Sustainment Program*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
0951: *Joint Warhead Fuze Sustainment Program*	504.114	108.199	62.203	23.226	-	23.226	25.100	2.227	0.000	0.000	0.000	725.069
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 178

A. Mission Description and Budget Item Justification

The Joint Warhead Fuze Sustainment Program is an effort to develop advanced components to improve the reliability, safety, and security of AF&F systems for nuclear reentry systems. The current effort is focused on supporting the alteration of the AF&F system for the MK5/W88 system which will be five years beyond its design life at the scheduled deployment of the AF&F alteration. This effort also supports future utilization of the developed components by the US Air Force and United Kingdom.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: TRIDENT II	108.199	62.203	23.226	0.000	23.226
Articles:	-	-	-	-	-
Description: Identify, prioritize, develop, proof, and demonstrate advanced technologies that will be leveraged and incorporated into future AF&Fs.					
FY 2019 Plans: Continue development, proofing, demonstration of identified advanced technologies for future AF&Fs Continue Support engineer working groups and program reviews. Continue AF&F sub-assembly design demonstrations Continue development of advanced safety and surety architecture solutions. Continue to develop and implement software changes due to AF&F Conduct performance assessment of tested designs Conduct production engineering Continue missile integration of the Mk5A Alt 370 fuze development, and perform pre-flight test and analysis Continue design, develop and qualify production tools and processes, testers, gauges, AF&F simulators and trainers Continue flight test and integration Continue Production Proof In (PPI) builds Conduct system vulnerability analysis Continue engineering support for Electromagnetic Environment testing and data analysis					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 0951 / *Joint Warhead Fuze Sustainment Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue thermal Battery Evaluations and Certifications Continue procurement of developmental hardware Continue qualification of developmental hardware					
FY 2020 Base Plans: Continue Support engineer working groups and program reviews Conduct production engineering Conduct performance assessment of tested designs Continue missile integration of the Mk5A Alt 370 fuze development, and perform pre-flight test and analysis Continue design, develop and qualify production tools and processes, testers, gauges, AF&F simulators and trainers Conduct system vulnerability analysis					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Program has completed software development required for Mk5 ALT 370 AF&F and began transitioning to production and engineering support. The program is starting to scale down and will be completed in FY22 (-38.977)					
Accomplishments/Planned Programs Subtotals	108.199	62.203	23.226	0.000	23.226

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/3219: *SBSD Nuclear Technology Development*	265.462	190.100	114.006	-	114.006	80.085	60.142	56.841	54.400	Continuing	Continuing
• RDTEN/3220: *Advanced Submarine System Development*	751.497	514.846	419.051	-	419.051	313.582	196.261	171.766	187.173	Continuing	Continuing
• OPN/5358: *SWS Modernization Funds*	238.675	256.817	280.510	-	280.510	241.396	254.053	259.020	264.201	0.000	3,189.691
• WPN/1250: *TRIDENT II Mods*	1,131.910	1,056.750	1,177.251	-	1,177.251	1,215.624	1,204.762	1,288.753	1,318.818	3,215.106	26,124.279
• SCN/1045: *OHIO Replacement Submarine*	861.853	3,173.400	1,698.907	-	1,698.907	3,921.212	4,196.024	3,871.536	4,789.491	85,685.907	108,971.468

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 0951 / *Joint Warhead Fuze Sustainment Program*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OMN/1D2D: *Fleet Ballistic Missile*	1,070.308	1,140.910	1,187.770	-	1,187.770	1,182.056	1,225.804	1,238.604	1,273.316	Continuing	Continuing

Remarks

D. Acquisition Strategy

Contracts will continue to be awarded to those sources who were engaged in the Mk4LE Reentry Body development program and are currently engaged in the production and/or operational support of the deployed Mk4LE Reentry Body on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (c) (1) and (3) implemented by FAR 6.302.-1, 3, 4

E. Performance Metrics

Not applicable

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 0951 / *Joint Warhead Fuze Sustainment Program*	

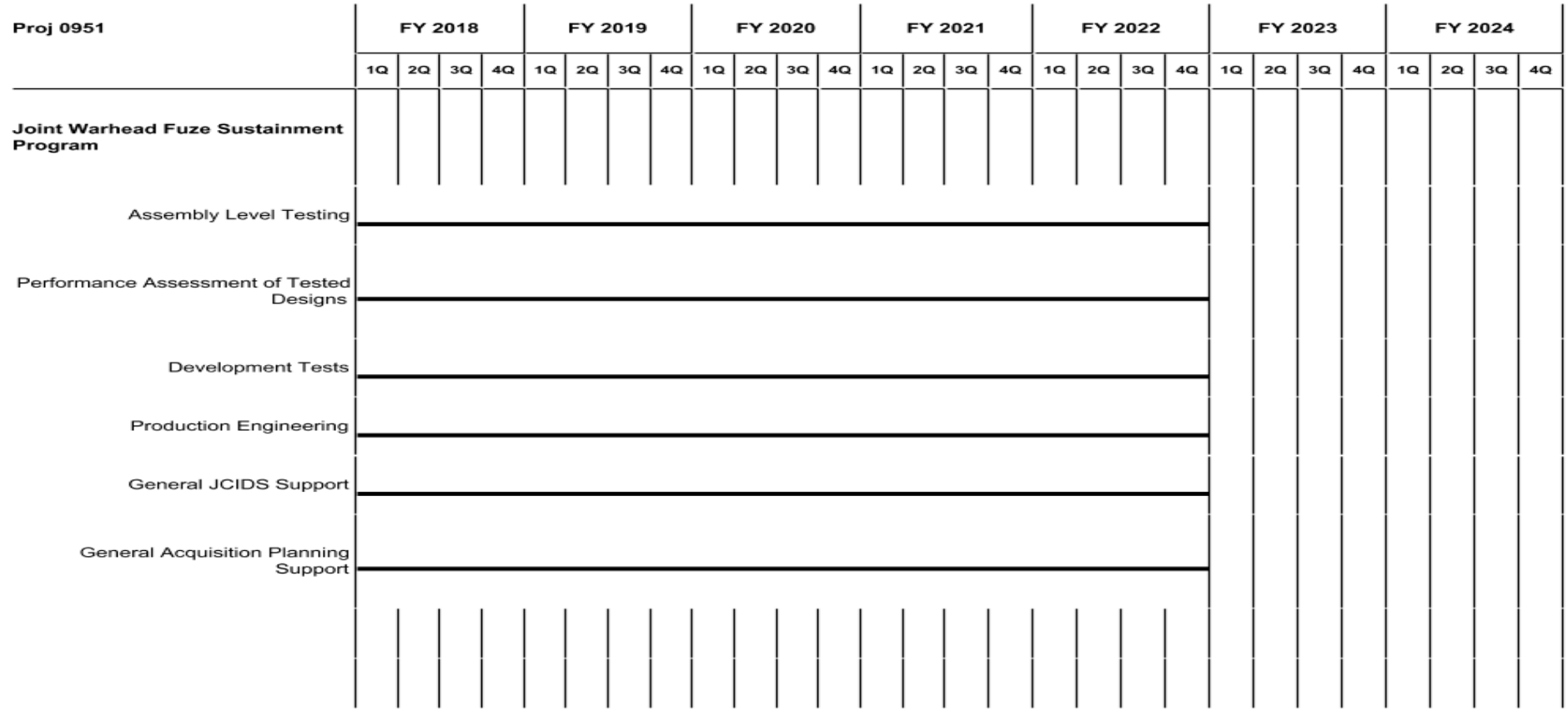
Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Joint Warhead Fuze Sustainment DOE	MIPR	DOE : NM	415.585	90.935	Feb 2018	48.855	Nov 2018	13.993	Nov 2019	-		13.993	0.000	569.368	-
Joint Warhead Fuze Sustainment ITT	SS/CPFF	ITT : VA	18.907	4.265	Feb 2018	3.851	Feb 2019	2.105	Nov 2019	-		2.105	0.000	29.128	-
Joint Warhead Fuze Sustainment LMMS	SS/CPFF	LMMS : CA	46.817	11.793	Feb 2018	7.931	Dec 2018	5.317	Nov 2019	-		5.317	0.000	71.858	-
Joint Warhead Fuze Sustainment	WR	NSWC Dahlgren : VA	18.606	0.318	Feb 2018	0.551	Nov 2018	1.044	Nov 2019	-		1.044	0.000	20.519	-
Joint Warhead Fuze Sustainment	SS/CPFF	BAE : MD	1.234	0.505	Mar 2018	0.150	Feb 2019	0.000		-		0.000	0.000	1.889	-
Joint Warhead Fuze Sustainment	SS/CPIF	APL : MD	0.785	0.144	Aug 2018	0.073	Feb 2019	0.000		-		0.000	0.000	1.002	-
Joint Warhead Fuze Sustainment	C/BA	GDAIS : MA	1.680	0.000		0.000		0.000		-		0.000	0.000	1.680	-
Joint Warhead Fuze Sustainment	WR	CNSW : ID	0.400	0.239	Feb 2018	0.000		0.243	Oct 2019	-		0.243	0.000	0.882	-
Joint Warhead Fuze Sustainment	WR	NCCC : Not Specified	0.100	0.000		0.000		0.000		-		0.000	0.000	0.100	-
Joint Warhead Fuze Sustainment	C/BA	TOYON : VA	0.000	0.000		0.792	Feb 2019	0.524	Nov 2019	-		0.524	0.000	1.316	-
		Subtotal	504.114	108.199		62.203		23.226		-		23.226	0.000	697.742	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	504.114	108.199		62.203		23.226		-		23.226	0.000	697.742	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 0951 / *Joint Warhead Fuze Sustainment Program*



2020PB - 0101221N - 0951

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 0951 / *Joint Warhead Fuze Sustainment Program*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0951				
Joint Warhead Fuze Sustainment Program: Assembly Level Testing:	1	2018	4	2022
Joint Warhead Fuze Sustainment Program: Performance Assessment of Tested Designs:	1	2018	4	2022
Joint Warhead Fuze Sustainment Program: Development Tests:	1	2018	4	2022
Joint Warhead Fuze Sustainment Program: Production Engineering:	1	2018	4	2022
Joint Warhead Fuze Sustainment Program: General JCIDS Support:	1	2018	4	2022
Joint Warhead Fuze Sustainment Program: General Acquisition Planning Support:	1	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 2021 / *Mk4A Shape Stable Nose Tip*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2021: *Mk4A Shape Stable Nose Tip*	0.000	5.771	27.169	22.820	-	22.820	13.990	7.408	5.892	6.007	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 178

A. Mission Description and Budget Item Justification

The Mk4A Shape Stable Nose Tip (SSNT) effort will convert reentry body (RB) forward shell assemblies (FSA's) from legacy carbon composite nose tips to SSNT's. This will require ground and flight testing of SSNT RBA's, updates and modifications to RB documentation (Weapon Specifications, Interface Control Drawings, product drawings etc), updated Fire Control software for fleet implementation, conversion of war reserve RB's to FSA's with SSNT, procurement/conversion of surveillance and flight test units, Strategic Weapons Facility (SWF) logistics implementation planning and execution, review and update Mk4A surveillance planning and the DoD share of National Nuclear Security Administration (NNSA) Office of Secure Transportation (OST) for shipping.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Mk4A Shape Stable Nose Tip	5.771	27.169	22.820	0.000	22.820
Articles:	-	-	-	-	-
FY 2019 Plans: Mk4A SSNT system requirements review SPALT/NWRO documentation Development of the reentry body aerodynamics model and associated fire control flight parameters Nosetip development hardware to support nosetip development testing Qualification and buildup for forward shell development testing.					
FY 2020 Base Plans: Continue Mk4A SSNT system requirements review Continue Development of the reentry body aerodynamics model and associated fire control flight parameters Continue Nosetip development hardware to support nosetip development testing Continue Qualification and buildup for forward shell development testing. Program and engineering support during material characterization of nosetip billet materials Engineering support for both development and qualification testing (ground and flight)					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2021 / *Mk4A Shape Stable Nose Tip*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding decrease due to the completion of documentation & updating requirements specifications for the impacts to Trident II(D5) and W76/Mk4A. This incorporates SSNT & updates in the Mk4A reentry body aerodynamics model systems requirements review. (-4.349)					
Accomplishments/Planned Programs Subtotals	5.771	27.169	22.820	0.000	22.820

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Contracts will continue to be awarded to those sources who were engaged in the Mk4LE Reentry Body development program and are currently engaged in the production and/or operational support of the deployed Mk4LE Reentry Body on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (c) (1) and (3) implemented by FAR 6.302.-1, 3, 4

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2021 / *Mk4A Shape Stable Nose Tip*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SSNT LMSS	SS/CPIF	LMSSC : CA	0.000	5.000	May 2018	19.930	Nov 2018	21.060	Dec 2019	-		21.060	Continuing	Continuing	Continuing
SSNT DOE/SNL	MIPR	DOE/SNL : NM	0.000	0.000		5.209	Feb 2019	0.700	Oct 2019	-		0.700	Continuing	Continuing	Continuing
SSNT JH-APL	SS/CPFF	APL : MD	0.000	0.000		1.000	Feb 2019	0.000		-		0.000	0.000	1.000	-
SSNT PERATON	SS/CPIF	PERATON : VA	0.000	0.000		0.515	Feb 2019	0.530	Oct 2019	-		0.530	Continuing	Continuing	Continuing
SSNT NSWC	WR	NSWC : VA	0.000	0.771	Jul 2018	0.515	Jan 2019	0.530	Dec 2019	-		0.530	Continuing	Continuing	Continuing
		Subtotal	0.000	5.771		27.169		22.820		-		22.820	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	5.771		27.169		22.820		-		22.820	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2021 / *Mk4A Shape Stable Nose Tip*

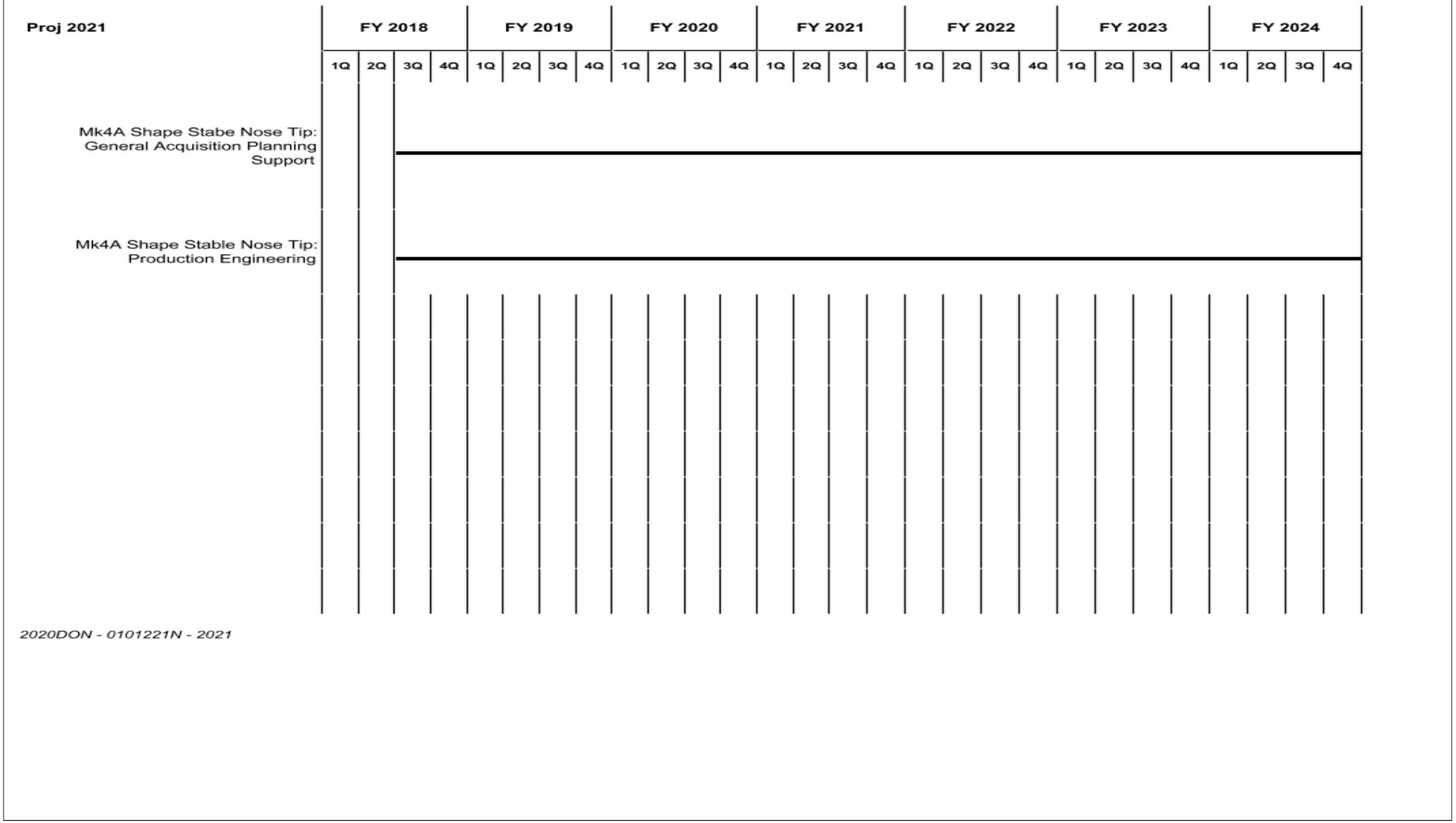


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2021 / *Mk4A Shape Stable Nose Tip*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2021				
Mk4A Shape Stabe Nose Tip: General Acquisition Planning Support: Schedule Detail	3	2018	4	2024
Mk4A Shape Stable Nose Tip: Production Engineering: Schedule Detail	3	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 2228 / *Technical Applications Programs*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2228: *Technical Applications Programs*	659.458	6.977	14.509	82.783	-	82.783	110.933	126.787	155.020	158.119	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Multi Star Enhanced Prelaunch (MEP) project leverages the capability of the D5 Life Extension Guidance (Mk6 Mod1) to sight two stars vice one combined with the interface updates to the Fire Control and Navigation subsystem, allowing for in-flight correction, the potential to operate in environments where Global Positioning System (GPS) is denied, and potential future relief to the strict tolerance requirements of the strategic navigator on the current OHIO class submarines and the COLUMBIA Class program. The Systems Engineering Modeling and Simulation capability will consist of three elements: Model Based Design, Strategic Weapon System (SWS) Integrated Modeling and Simulation/Common Architecture & Framework, and SWS Enhancement Ground Test. This effort will provide the capability to comprehensively evaluate and test the integrated SWS within representative operational environments, providing unprecedented visibility across the SWS and system performance characterization equivalent to flight testing. This capability will enable trade space analysis to identify technical margin, subsystem interactions, and lifecycle affordability opportunities to include other services and be able to identify the benefits and risks of commonality to the individual programs, requirements and CONOPs modifications that could facilitate commonality, potential common acquisition strategies between the services, and total life cycle cost implications.

Starting in FY 2020 this project will begin development for D5 Life Extension D5LE2. The D5LE2 will include System Level Architecture Trades and Design Processes in which initial planning and system technology trade studies are necessary to begin preparing for D5LE2. Investments are required starting in FY20 to begin trading system architecture concepts and implementing modern model based design and system engineering practices. D5LE2 Avionics Architecture & Technology Development will include legacy D5 and D5LE electronic technologies now obsolete and manufacturing lines shutdown. Avionics architectures, sensor, bus and component designs are inherently complex with design and manufacturing technologies continuously evolving. Technology advancements and improved system architecture concepts have the potential to improve system capability, modularity, manufacturability, SWS operations and sustainability.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Multi-Star Enhanced Prelaunch (MEP)	5.756	9.973	10.709	0.000	10.709
Articles:	-	-	-	-	-
FY 2019 Plans:					
Continue DASO 30 Hardware in the Loop Testing					
Navigation DASO 30 Software Integration Development					
Continue DASO 30 SWS Subsystem Integrated Testing and Analysis					
DASO 30 Interface Coordination Documentation complete					
Software design readiness review					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2228 / *Technical Applications Programs*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
DASO Shipment ***FY 2020 Base Plans:*** Continue DASO 30 Hardware in the Loop Testing Continue Navigation DASO 30 Software Integration Development Continue DASO 30 SWS Subsystem Integrated Testing and Analysis Continue DASO 30 Interface Coordination Documentation complete Continue Software design readiness review ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to minor rate and inflation adjustments.					
Title: D5LE2	0.000	0.000	68.184	0.000	68.184
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** System Effectiveness Trade Studies: - Evaluate architectures/concepts for various system level requirements - Requirements definition and proofing Radiation Hardened Architecture: - Evaluate current allocation of requirements -Evaluate enabling architectures or CONOPs to meet requirements SWS Functional and Behavior Modeling Development and identify feasible solutions sets Testability CONOPs Study: - Ability to determine missile health and status without pulling missiles ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2228 / *Technical Applications Programs*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
D5LE2 is a new effort. The Navy will begin studies to define a cost-effective, credible, and effective D5 SLBM replacement that can deploy throughout the service life of the COLUMBIA SSBN.					
Title: System Engineering Modeling and Simulation	1.221	4.536	3.890	0.000	3.890
Articles:	-	-	-	-	-
FY 2019 Plans: Continue develop model based design integration plan. Continue modeling and simulation gap analysis. Continue assessment on RadHard avionics and electronics technology and affordability. Continue assessment on propellant technologies. Continue assessment on new Post Boost Control and Electro-Mechanical Thrust Vector Control (TVC) systems for improved Mission flexibility and affordability. Begin Functional Simulation Development. Begin system Behavioral Model Development.					
FY 2020 Base Plans: Continue develop model based design integration plan. Continue modeling and simulation gap analysis. Continue assessment on RadHard avionics and electronics technology and affordability. Continue assessment on propellant technologies. Continue assessment on new Post Boost Control and Electro-Mechanical Thrust Vector Control (TVC) systems for improved Continue Mission flexibility and affordability. Continue Functional Simulation Development. Continue System Behavioral Model Development.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to minor rate and inflation adjustments.					
Accomplishments/Planned Programs Subtotals	6.977	14.509	82.783	0.000	82.783

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2228 / *Technical Applications Programs*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

Contracts will continue to be awarded to those sources who were engaged in program and are currently engaged in the production and/or operational support on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (c) (1) and (3) implemented by FAR 6.302.-1, 3, 4

E. Performance Metrics

Not applicable

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 2228 / *Technical Applications Programs*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technical Applications CSDL	SS/CPFF	CSDL : MA	333.572	4.032	Oct 2018	11.757	Jan 2019	23.306	Nov 2019	-		23.306	Continuing	Continuing	Continuing
Technical Applications NSWC	WR	NSWC : VA	94.318	0.300	Jul 2018	0.352	Jan 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Technical Applications DOE	MIPR	DOE : NM	33.717	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Technical Applications ITT	SS/CPFF	ITT : CO	12.194	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Technical Applications LMSS	SS/CPFF	LMSS : CA	164.272	1.000	May 2018	1.800	Jan 2019	37.676	Dec 2019	-		37.676	Continuing	Continuing	Continuing
Technical Applications AERO	SS/CPFF	AERO : CA	3.068	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Technical Applications VAR	Various	Various : Various	18.317	1.345	Jun 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Technical Applications GD-AIS	SS/CPFF	GDMS : MA	0.000	0.300	Oct 2017	0.600	Jan 2019	1.500	Nov 2019	-		1.500	Continuing	Continuing	Continuing
Technical Applications ARL	SS/CPFF	ARL : TX	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Technical Applications APL	SS/CPFF	APL : MD	0.000	0.000		0.000		12.003	Dec 2019	-		12.003	Continuing	Continuing	Continuing
Technical Applications BAE	SS/CPFF	BAE : MD	0.000	0.000		0.000		0.306	Nov 2019	-		0.306	0.000	0.306	-
Technical Applications NGMS	SS/CPFF	NGMS : CA	0.000	0.000		0.000		1.032	Nov 2019	-		1.032	0.000	1.032	-
Technical Applications NIR	SS/CPFF	NIR : Not Specified	0.000	0.000		0.000		6.960	Nov 2019	-		6.960	0.000	6.960	-
		Subtotal	659.458	6.977		14.509		82.783		-		82.783	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	659.458	6.977		14.509		82.783		-		82.783	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2228 / *Technical Applications Programs*

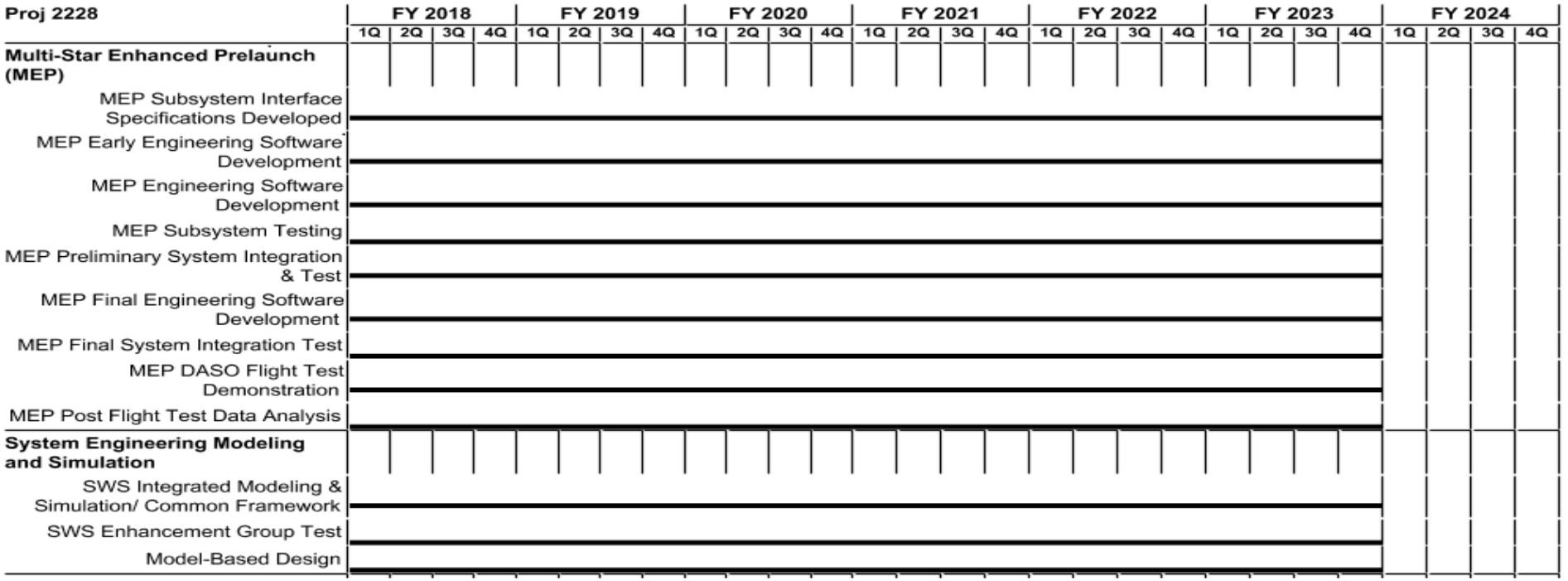


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2228 / *Technical Applications Programs*

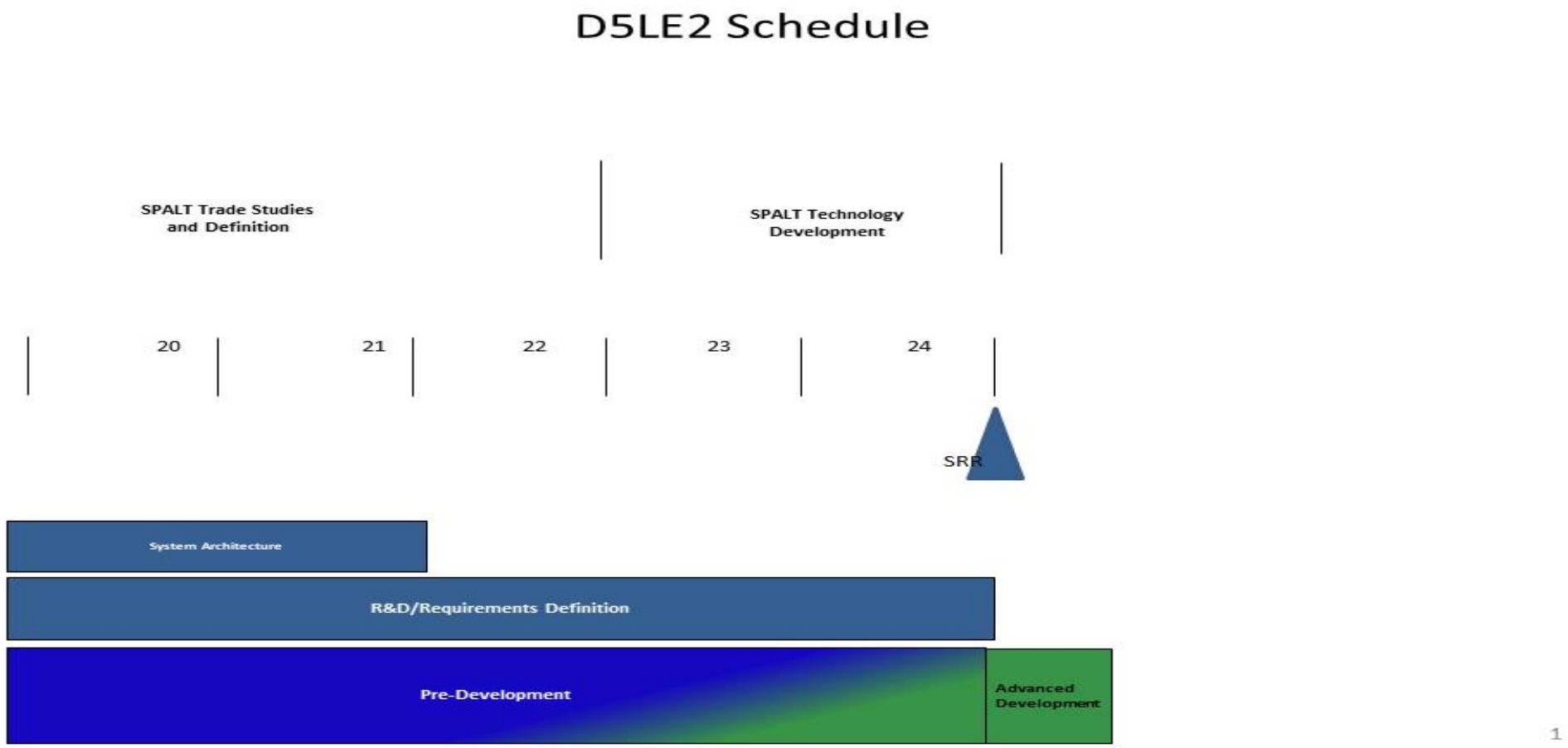


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 2228 / *Technical Applications Programs*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2228				
Multi-Star Enhanced Prelaunch (MEP): MEP Subsystem Interface Specifications Developed:	1	2018	4	2023
Multi-Star Enhanced Prelaunch (MEP): MEP Early Engineering Software Development:	1	2018	4	2023
Multi-Star Enhanced Prelaunch (MEP): MEP Engineering Software Development:	1	2018	4	2023
Multi-Star Enhanced Prelaunch (MEP): MEP Subsystem Testing:	1	2018	4	2023
Multi-Star Enhanced Prelaunch (MEP): MEP Preliminary System Integration & Test:	1	2018	4	2023
Multi-Star Enhanced Prelaunch (MEP): MEP Final Engineering Software Development:	1	2018	4	2023
Multi-Star Enhanced Prelaunch (MEP): MEP Final System Integration Test:	1	2018	4	2023
Multi-Star Enhanced Prelaunch (MEP): MEP DASO Flight Test Demonstration:	1	2018	4	2023
Multi-Star Enhanced Prelaunch (MEP): MEP Post Flight Test Data Analysis:	1	2018	4	2023
System Engineering Modeling and Simulation: SWS Integrated Modeling & Simulation/ Common Framework:	1	2018	4	2023
System Engineering Modeling and Simulation: SWS Enhancement Group Test:	1	2018	4	2023
System Engineering Modeling and Simulation: Model-Based Design:	1	2018	4	2023
D5LE2:	1	2020	4	2024
D5LE2: System Effectiveness Trade Studies: Schedule Detail	1	2020	4	2024
D5LE2: Radiation Hardened Architecture: Schedule Detail	1	2020	4	2024
D5LE2: SWS Functional & Behavior Modeling Develoment: Schedule Detail	1	2020	4	2024
D5LE2: Testability CONOPs Study: Schedule Detail	1	2020	4	2024
D5LE2: Evaluate Performance Architecture: Schedule Detail	1	2022	4	2024
D5LE2: Nuclear Weapons Surety: Schedule Detail	1	2023	4	2024
D5LE2: Functional Simulation Develoment: Schedule Detail	1	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 3097 / *W78/88-1 Life Extension Program*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3097: *W78/88-1 Life Extension Program*	0.000	0.000	24.000	26.000	-	26.000	0.000	0.000	0.000	0.000	0.000	50.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 3097 RDTEN project will evaluate and down-select of a range of options to meet USSTRATCOM requirements for a future Navy warhead variant. In FY20, the study will enter Phase 6.2 to further refine the down-selected concepts, screening criteria and programmatic tradeoffs (e.g., cost, schedule, technical maturity) for the concepts being considered.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: IW	0.000	24.000	26.000	0.000	26.000
Articles:	-	-	-	-	-
FY 2019 Plans: System requirements definition. System Requirements Review (SRR) DoD/DoE and Missile/Reentry/Fire Control interface definition Subsystem design integration and assessments Thermal Protection System/ Release Assembly (TPS/RA) conceptual design Nuclear Explosive Package (NEP) design integration Radar Module, pathlength Module,and missile Interface and Controller Module Fire Control requirements definition & software development					
FY 2020 Base Plans: Phase 6.2 study plan Systems Engineering Program Plan (SEMP) System Qualification and SPALT planning Ground and flight test program planning System assessment tools and models development System Safety Program Plan Technology Readiness Level/ Manufacturing Readiness Level (TRL/MRL) assessment AF&F component conceptual design (Radar Module, Pathlength Module, Missile Interface and Controller Module, Thermal Battery Assemblies) Preliminary reliability and safety impact assessment Modeling and analysis, flight sciences support					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 3097 / *W78/88-1 Life Extension Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Deployment planning ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding in FY19/20 supports the DOE Phase 6.2/6.2A study for the Interoperable Warhead Program and begins system requirements definition and design activities. Increased funding in FY20 provides for additional program planning and systems engineering activities including flight and ground test planning and AF&F conceptual design activities.					
Accomplishments/Planned Programs Subtotals	0.000	24.000	26.000	0.000	26.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Contracts will be awarded to those sources who were engaged in the W78/88-1 Life Extension Program and are currently engaged in the production and/or operational support of the deployed W78/88-1 Systems on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (c) (1) and (3) implemented by FAR 6.302.-1, 3, 4

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 3097 / *W78/88-1 Life Extension Program*	

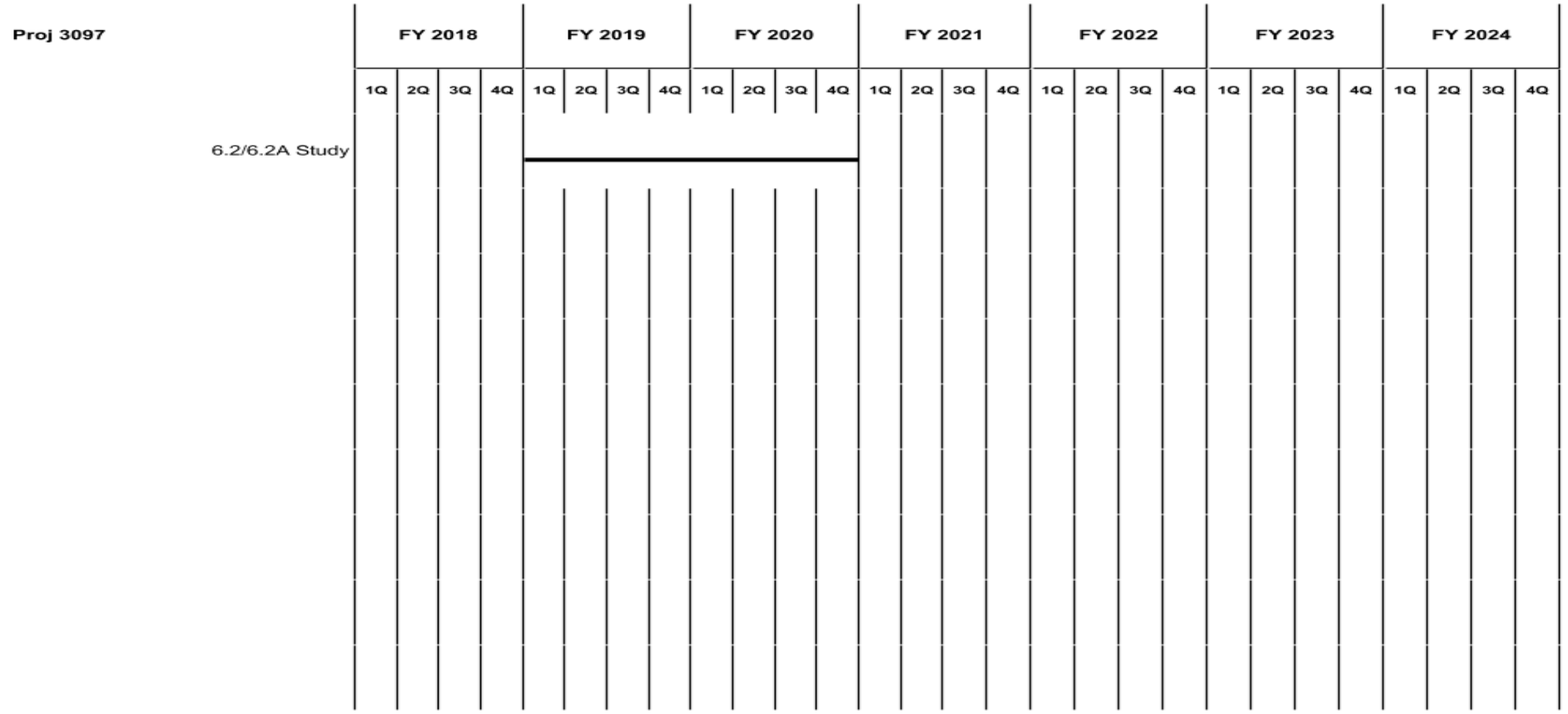
Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
W78/88-1 Life Ext Program	SS/CPFF	LMSSC : CA	0.000	0.000		17.000	Dec 2018	22.300	Jan 2020	-		22.300	0.000	39.300	-
W78/88-1 Life Ext Program	MIPR	DOE : NM	0.000	0.000		4.000	Feb 2019	3.700	Jan 2020	-		3.700	0.000	7.700	-
W78/88-1 Life Ext Program	SS/CPFF	PERATON : VA	0.000	0.000		3.000	Dec 2018	0.000		-		0.000	0.000	3.000	-
		Subtotal	0.000	0.000		24.000		26.000		-		26.000	0.000	50.000	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		24.000		26.000		-		26.000	0.000	50.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 3097 / *W78/88-1 Life Extension Program*



2020PB - 0101221N - 3097

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 3097 / *W78/88-1 Life Extension Program*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3097				
6.2/6.2A Study:	1	2019	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 3158 / *Integrated Nuclear Weapons Security Sys Dev*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3158: *Integrated Nuclear Weapons Security Sys Dev*	29.096	2.726	2.798	2.847	-	2.847	2.919	2.982	3.041	3.102	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Enhanced Special Weapons effort supports the Nuclear Weapons Security (NWS) program and SSBN Escort mission. The policies and requirements regarding the safeguard of nuclear weapons within the Department of Defense is established by DoD S5210.41M. Within the Department of the Navy, nuclear weapons are limited to TRIDENT Fleet Ballistic Missiles (FBM), either deployed aboard TRIDENT submarines or located landside at Naval Submarine Base, Kings Bay or Naval Submarine Base, Bangor where missiles are first assembled as well as repaired. The CNO has assigned SSP, the FBM program manager, with mission responsibility for the safeguard of FBM nuclear assets. More specifically, the mission includes landside and pier operations as well as transits to and from the dive point, each of which present challenges to personnel as well as existing technologies. This budget supports efforts directed at improving the current technological baseline through a series of studies focusing on land and in transit requirements. Collectively, these efforts will improve countermeasure technologies addressing detection, delay and denial.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Integrated Nuclear Weapons Security Sys Dev	2.726	2.798	2.847	0.000	2.847
Articles:	-	-	-	-	-
FY 2019 Plans: Continue Wide Area/Extended Detection: Development of technologies to increase detection, localization, classification, and tracking capabilities beyond the perimeter of the limited area, waterfront restricted area, along the convoy route and transit route. This effort includes technologies to detect intruders in difficult environments such as dense foliage, marsh, fog and heavy rain. Continue research and development efforts towards the improvement of countermeasures technologies addressing detection, delay and denial. Continue Analysis of Alternatives on WQX-2 follow on Sensor Selection & Transition					
FY 2020 Base Plans: Continue Wide Area/Extended Detection: Development of technologies to increase detection, localization, classification, and tracking capabilities beyond the perimeter of the limited area, waterfront restricted area, along the convoy route and transit route. This effort includes technologies to detect intruders in difficult environments such as dense foliage, marsh, fog and heavy rain. Continue research and development efforts towards the improvement of countermeasures technologies addressing detection, delay and denial.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 3158 / *Integrated Nuclear Weapons Security Sys Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue Analysis of Alternatives on WQX-2 follow on Sensor Selection & Transition ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to minor rate and inflation adjustments.					
Accomplishments/Planned Programs Subtotals	2.726	2.798	2.847	0.000	2.847

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/Various-2: *OPN (Nuclear Weapons Security)*	28.559	29.852	41.991	-	41.991	34.427	35.098	35.791	36.506	Continuing	Continuing
• OMN/11D2D-3: *Fleet Ballistic Missile (Nuclear Weapons Security)*	86.489	81.424	82.569	-	82.569	84.073	85.708	87.466	89.213	Continuing	Continuing
• OMN/11D2D-5: *Fleet Ballistic Missile (Transit/Escort)*	90.816	110.861	124.191	-	124.191	108.328	109.703	111.526	113.665	Continuing	Continuing
• MCN/Various-1: *MILCON (CNI) (Nuclear Weapons Security)*	0.000	88.960	0.000	-	0.000	0.000	155.440	0.000	0.000	0.000	386.589

Remarks

D. Acquisition Strategy

Procurements are being executed through a combination of private contractors (large and small business), government Centers of Excellence (COEs), other government agencies and the Naval Submarine Bases, Kitsap and Kings Bay. Contract awards are based upon "best value" determinations, and where practical will be performance based or include incentive provisions.

E. Performance Metrics

Not applicable

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 3158 / *Integrated Nuclear Weapons Security Sys Dev*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Nuclear Weapons Security Sys Dev	SS/CPFF	APL : MD	3.895	0.275	Aug 2018	0.199	Feb 2019	2.647	Nov 2019	-		2.647	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	WR	NSWC : VA	4.297	0.252	Oct 2017	0.201	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	SS/CPFF	JRC : VA	3.020	0.276	Feb 2018	0.233	Feb 2019	0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	C/BA	DRAPER : MA	0.355	0.000		0.201	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	WR	CNS : ID	0.000	0.652	Oct 2018	1.300	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys	C/CPFF	GDMS : MA	0.000	0.442	Feb 2018	0.456	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys	C/BA	ONR : DC	0.000	0.000		0.208	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	WR	NFESC : CA	2.700	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	WR	CNWS : CA	0.404	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	WR	SNWS : CA	4.558	0.222	Feb 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	MIPR	DOE : NM	0.425	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	SS/CPFF	ARL : TX	1.880	0.225	Feb 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 3158 / *Integrated Nuclear Weapons Security Sys Dev*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Nuclear Weapons Security Sys Dev	WR	NUWD : WA	0.881	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	C/BA	NRL : DC	1.188	0.262	Oct 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	WR	NUWC : RI	1.578	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	C/BA	SPAWAR : CA	0.390	0.120	Feb 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	C/BA	SPA : VA	0.475	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	MIPR	ATC : TX	0.461	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	WR	NEDU : FL	0.383	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	SS/CPFF	LMSS : CA	2.026	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Integrated Nuclear Weapons Security Sys Dev	MIPR	DOEI : ID	0.180	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	29.096	2.726		2.798		2.847		-		2.847	Continuing	Continuing	N/A

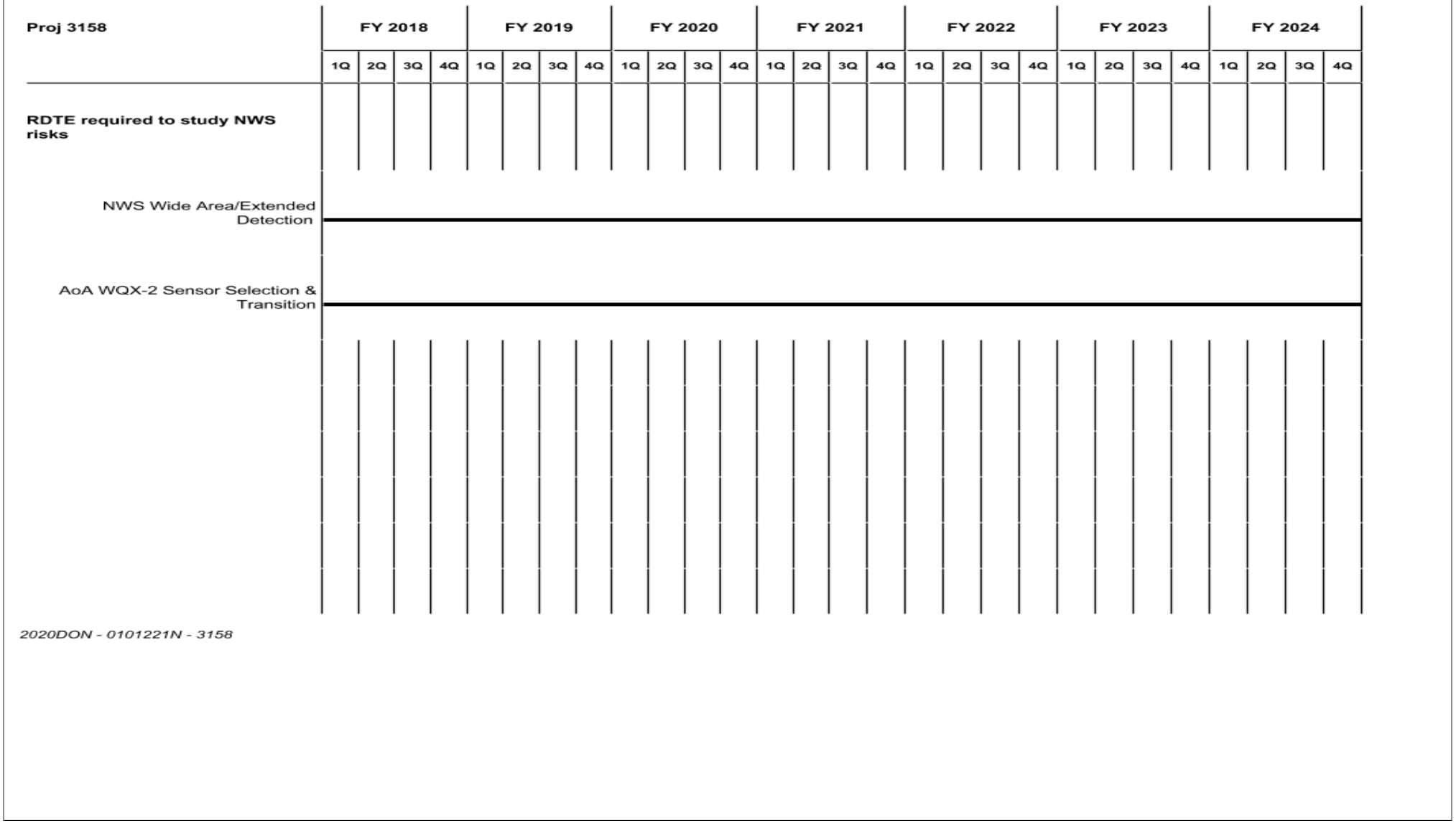
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	29.096	2.726		2.798		2.847		-		2.847	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 3158 / *Integrated Nuclear Weapons Security Sys Dev*	

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 3158 / *Integrated Nuclear Weapons Security Sys Dev*



2020DON - 0101221N - 3158

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 3158 / *Integrated Nuclear Weapons Security Sys Dev*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3158				
RDTE required to study NWS risks: NWS Wide Area/Extended Detection:	1	2018	4	2024
RDTE required to study NWS risks: AoA WQX-2 Sensor Selection & Transition: Schedule Detail	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	6.979	17.700	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	24.679
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding is a congressional add to support Modeling and Simulation efforts for the Strategic Weapon System. The Systems Engineering Modeling and Simulation capability will consist of three elements: Model Based Design, Strategic Weapon System (SWS) Integrated Modeling and Simulation/Common Architecture & Framework, and SWS Enhancement Ground Test. This effort will provide the capability to comprehensively evaluate and test the integrated SWS within representative operational environments, providing unprecedented visibility across the SWS and system performance characterization equivalent to flight testing. This capability will enable trade space analysis to identify technical margin, subsystem interactions, and lifecycle affordability opportunities to include other services and be able to identify the benefits and risks of commonality to the individual programs, requirements and CONOPs modifications that could facilitate commonality, potential common acquisition strategies between the services, and total life cycle cost implications.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Program Increase	6.979	0.000
FY 2018 Accomplishments: NSS Error Model Fire Control Interface Model Updated Missile Eclectic Guidance Algorithm Model Models have been integrated into deterministic simulations (VSSIM), covariance simulations, and HWIL and used to validate SWS interfaces and algorithms Fire Control data used to drive VSSIM Fire Control/Guidance Integration testing with GHWIL at Eastern Range Missile/Guidance Integration testing with the GHWIL at LM Missile Simulation Center		
FY 2019 Plans: N/A		
Congressional Add: Model Based Systems Engineering	0.000	15.000
FY 2018 Accomplishments: N/A		
FY 2019 Plans: - Update Standards and Methods based upon FY18 Accomplishments - Improve Model Based Engineering (MBE) Infrastructure for data and model exchange in secure environment - Update Process with lessons learned from FY18 Accomplishments		

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
- Implement command MBE training for civilian and military staff		
Congressional Add: Autonomous Strategic Force Protection Sensor Network	0.000	2.700
FY 2018 Accomplishments: N/A		
FY 2019 Plans: Develop advanced sensor systems for counterterrorism and antiterrorism operations to meet rigorous performance metrics necessary for nuclear facility, material, and weapons protection.		
Congressional Adds Subtotals	6.979	17.700

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Contracts will be awarded to those sources who were engaged in program and are currently engaged in the production and/or operational support on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (c) (1) and (3) implemented by FAR 6.302.-1, 3, 4

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101221N / *Strategic Sub & Wpns Sys Supt*	Project (Number/Name) 9999 / *Congressional Adds*	

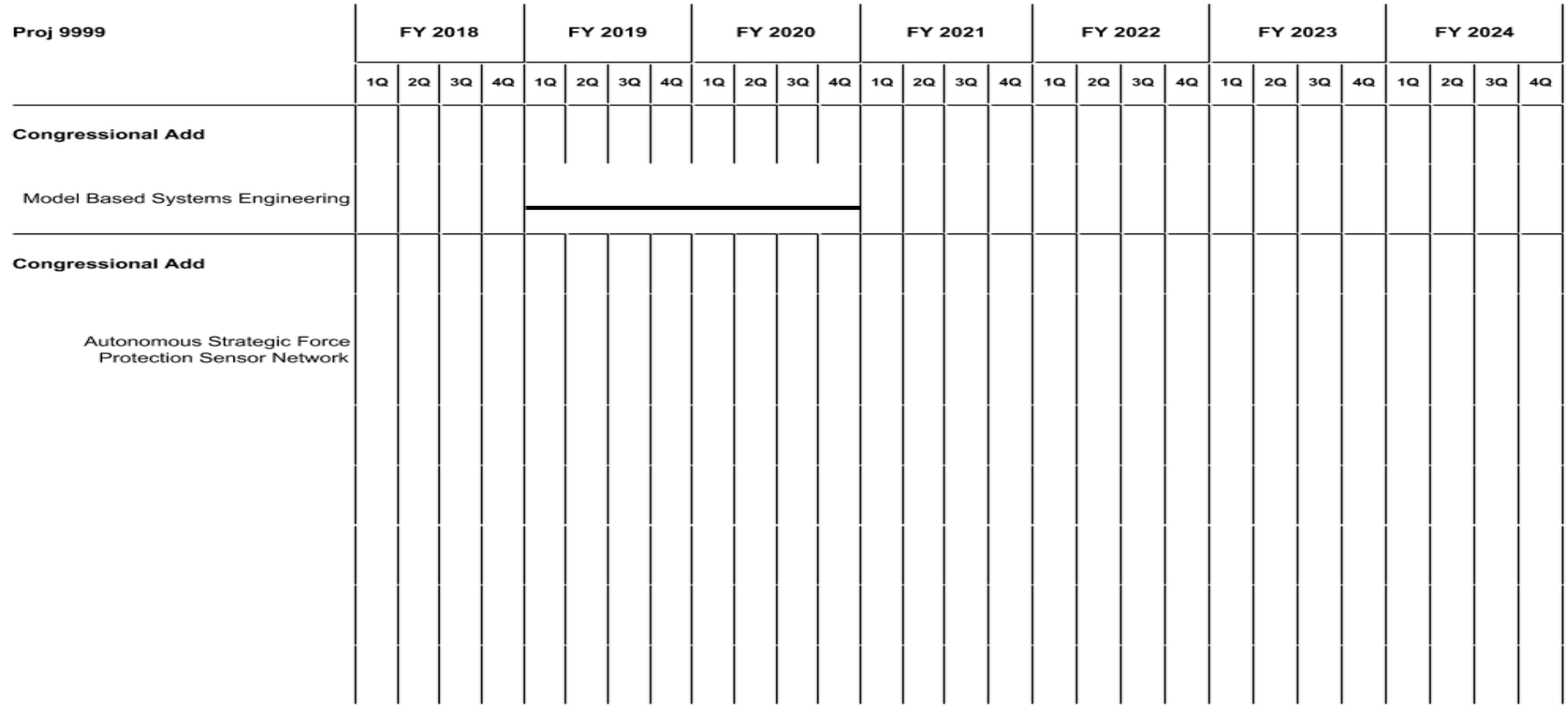
Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technical Applications CSDL	SS/CPFF	CSDL : MA	0.000	5.300	Jul 2018	0.000		0.000		-		0.000	0.000	5.300	-
Technical Applications VAR	Various	Various : Various	0.000	0.300	Jul 2018	0.000		0.000		-		0.000	0.000	0.300	-
Technical Applications GD-AIS	SS/CPFF	GDMS : MA	0.000	1.379	Aug 2018	0.000		0.000		-		0.000	0.000	1.379	-
Model Based System Engineering	Various	various : various	0.000	0.000		15.000	Jun 2019	0.000		-		0.000	0.000	15.000	-
Autonomous Strategic Force Protection Sensor Network	Various	various : various	0.000	0.000		2.700	Jul 2019	0.000		-		0.000	0.000	2.700	-
		Subtotal	0.000	6.979		17.700		0.000		-		0.000	0.000	24.679	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	6.979		17.700		0.000		-		0.000	0.000	24.679	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 9999 / *Congressional Adds*



2020PB - 0101221N - 9999

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101221N / *Strategic Sub & Wpns Sys Supt*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Congressional Add: Model Based Systems Engineering: Congressional Model Based Systems Engineering	1	2019	4	2020
Congressional Add: Autonomous Strategic Force Protection Sensor Network: Congressional Autonomous Strategic Force Protection Sensor Network	1	2019	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0101226N *I Submarine Acoustic War Dev*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	37.993	9.439	11.311	6.815	-	6.815	14.663	29.028	37.847	23.723	Continuing	Continuing
1265: *Sub Defensive Warfare*	37.993	9.439	11.311	6.815	-	6.815	14.663	29.028	37.847	23.723	Continuing	Continuing

A. Mission Description and Budget Item Justification

FY20 funding request was reduced by $2.249M to account for the availability of prior year execution balances.

The Submarine Acoustic Warfare (SAWS) Development program develops acoustic countermeasures, submarine defense capabilities, external launch systems and all acoustic augmentation systems for the U.S. Navy submarines. This program is comprised of the Submarine Defensive Warfare Program which improves the survivability of all U.S. Submarines. The Submarine Defensive Warfare Program efforts include Submarine Torpedo Defense System (Sub TDS), Undersea Defense Working Group ((UDWG), was formerly Torpedo Defense Working Group -(TDWG)), Technical Direction Agent (TDA), and In-Service Engineering Agent (ISEA) development support.

Submarine Torpedo Defense System (SubTDS) program, (ACAT III) currently is in Engineering and Manufacturing Development (E&MD) and has been restructured to focus on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the Fleet. The restructuring made the program more affordable by diverting funding in a zero sum transfer from the sabot development effort which, as a portion of the SubTDS program will be developed later. The overall program will develop the Tactical Decision Aid (TacDA) and SABOT that permits the ADC MK5 to be employed from external countermeasure launcher (ECL). The ADC MK5 development will result in delivering fully functional test units and Engineering Development Model (EDM) variants. The ADC MK5 will bring new technologies including adaptability packaged in a three-inch diameter body.
FY2019 funding will primarily support on-going SubTDS development including component and subsystem design, design and delivery of three Engineering Development Model (EDM) variants, and joint contractor and government testing. Governmental development of the TacDA will continue to include initial integration with the contractor developed ADC MK5 device.

FY2020 funding will support continued SubTDS development and testing efforts. The Undersea Defense Working Group (UDWG), is a working group comprised of fleet, resource sponsor, (testing community) and acquisition community representatives to assess fleet threats and the effectiveness of our countermeasure and systems against these threats, both known and projected. This includes associated studies, demonstrations, models, and simulations. The Technical Direction Agent (TDA) and In-Service Engineering Agent (ISEA) will provide hardware and software development support for Acoustic Devices Countermeasure (ADC) as well as Countermeasures Set, Acoustic (CSA) systems, future variants, and Acoustic Augmentation Support Systems (AASS) in the Acoustic Augmentation Support Program (AASP), and advanced communication systems improvements in support of the AASP, including component level technical insertion.

The SAWS Development Program transitions the research and development of new technologies and capabilities developed under the Future Naval Capabilities (FNC), Small Business and Innovative Research (SBIR), and other Research, Development, Test & Evaluation (RDT&E) initiatives. New and emerging hardware and software are evaluated in representative acoustic environments, against projected threats through both digital and hardware-in-the-loop simulations, to determine their effectiveness and impact on improving submarine survivability. The technology is then incorporated into the appropriate product line. Additionally, this effort also includes advanced studies product development and improvements for Submarine Acoustic Warfare Systems (SAWS) including but not limited to AASP and SubTDS.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0101226N *I Submarine Acoustic War Dev*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	12.053	11.311	9.309	-	9.309
Current President's Budget	9.439	11.311	6.815	-	6.815
Total Adjustments	-2.614	0.000	-2.494	-	-2.494
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.295	0.000			
• SBIR/STTR Transfer	-0.319	0.000			
• Program Adjustments	0.000	0.000	-2.301	-	-2.301
• Rate/Misc Adjustments	0.000	0.000	-0.193	-	-0.193

Change Summary Explanation

Financial:

The FY20 funding request was reduced by $2.249M to account for the availability of prior year execution balances. Additional adjustments included contract services reform reduction (-$0.053M) and miscellaneous rate adjustments
(-$0.193M), bringing the total difference from PB 19 to PB 20 to -$2.494M.

The Department assessed FY18 by $0.319M for Small Business Innovative Research, and reprogrammed $2.295M for higher navy priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*				Project (Number/Name) 1265 / *Sub Defensive Warfare*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
1265: *Sub Defensive Warfare*	37.993	9.439	11.311	6.815	-	6.815	14.663	29.028	37.847	23.723	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Submarine Acoustic Warfare (SAWS) Development program develops acoustic countermeasures, submarine defense capabilities, external launch systems and all acoustic augmentation systems for the U.S. Navy submarines. This program is comprised of the Submarine Defensive Warfare Program which improves the survivability of all U.S. Submarines. The Submarine Defensive Warfare Program efforts include Submarine Torpedo Defense System (Sub TDS), Undersea Defense Working Group ((UDWG), was formerly Torpedo Defense Working Group -(TDWG)), Technical Direction Agent (TDA), and In-Service Engineering Agent (ISEA) development support.

Submarine Torpedo Defense System (SubTDS) program, (ACAT III) currently is in Engineering and Manufacturing Development (E&MD) and has been restructured to focus on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the Fleet. The restructuring made the program more affordable by diverting funding in a zero sum transfer from the sabot development effort which, as a portion of the SubTDS program will be developed later. The overall program will develop the Tactical Decision Aid (TacDA) and SABOT that permits the ADC MK5 to be employed from external countermeasure launcher (ECL).
The ADC MK5 development will result in delivering fully functional test units and Engineering Development Model (EDM) variants. The ADC MK5 will bring new technologies including adaptability packaged in a three-inch diameter body.
FY2019 funding will primarily support on-going SubTDS development including component and subsystem design, design and delivery of three Engineering Development Model (EDM) variants, and joint contractor and government testing. Governmental development of the TacDA will continue to include initial integration with the contractor developed ADC MK5 device.

FY2020 funding will support continued SubTDS development and testing efforts. The Undersea Defense Working Group (UDWG), is a working group comprised of fleet, resource sponsor, (testing community) and acquisition community representatives to assess fleet threats and the effectiveness of our countermeasure and systems against these threats, both known and projected. This includes associated studies, demonstrations, models, and simulations. The Technical Direction Agent (TDA) and In-Service Engineering Agent (ISEA) will provide hardware and software development support for Acoustic Devices Countermeasure (ADC) as well as Countermeasures Set, Acoustic (CSA systems, future variants, and Acoustic Augmentation Support Systems (AASS) in the Acoustic Augmentation Support Program (AASP), and advanced communication systems improvements in support of the AASP, including component level technical insertion.

The SAWS Development Program transitions the research and development of new technologies and capabilities developed under the Future Naval Capabilities (FNC), Small Business and Innovative Research (SBIR), and other Research, Development, Test & Evaluation (RDT&E) initiatives. New and emerging hardware and software are evaluated in representative acoustic environments, against projected threats through both digital and hardware-in-the-loop simulations, to determine their effectiveness and impact on improving submarine survivability. The technology is then incorporated into the appropriate product line. Additionally, this effort also includes advanced studies product development and improvements for Submarine Acoustic Warfare Systems (SAWS) including but not limited to AASP and SubTDS.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Submarine Torpedo Defense System (SubTDS)	9.439	11.311	6.815	0.000	6.815
Articles:	-	3	29	-	29
FY 2019 Plans: - Continue EDM designs and builds - Continue development of deliver three ADC MK5 Engineering Development Model (EDM) variants - Continue M&S for known and projected torpedo threats - Continue development of required Acquisition program documentation - Continue development of CONOPS and TacDA for fleet tactics - Start contractor and government testing of EDM-1 variants - Continue assessment of threat by UDWG and WAF with updated vulnerability assessments - Complete SubTDS TEMP					
FY 2020 Base Plans: - Deliver three ADC MK5 EDM Variants - Continue ADC MK5 EDM Designs and Builds - Conduct ADC MK5 Critical Design Review - Continue M&S for known and projected torpedo threats - Continue development of required program documentation - Continue development of Concept of Operations (CONOPS) and TacDA for fleet tactics - Continue assessment of threat by UDWG and WAF with updated vulnerability assessments - Begin Development Testing (DT) of EDM-1 variants					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The FY19 to FY 20 decrease is due to three(3) ADC MK5 EDMs delivered in FY19 and SubTDS TEMP is completed in FY19.					
Accomplishments/Planned Programs Subtotals	9.439	11.311	6.815	0.000	6.815

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2210: *Submarine Acoustic Warfare System*	21.449	21.615	23.545	-	23.545	23.860	24.677	24.969	26.632	Continuing	Continuing

Remarks

D. Acquisition Strategy

Submarine Acoustic Warfare System (SAWS) develops Undersea Defensive Warfare technologies to improve the survivability of all U.S. Submarine classes.

The integration of technology into the ADC MK5 and the ADC MK5-capable CSA MK 3/4 external countermeasure launcher system will continue through FY2027. The ADC MK5 development contract awarded in FY2018, through a full and open competition, Cost Plus Incentive Fee (CPIF) contract. Engineering Development Model (EDM) variants, Technical Data Packages (TDP), and Low-Rate Initial Production (LRIP) units for accomplishing Operational Testing, will be delivered to the Navy under this contract. ADC MK5 contractor subsystem testing in FY2019 through FY2022 and joint contractor/Navy Development Testing (DT) will be in FY2020 through FY2022, with Navy Operational Testing (OT) in FY2023 through FY2024. Milestone C is nominally in FY2023. Initial Operational Capability (IOC) is nominally FY2025 for the Internal Countermeasure Launcher (ICL). After successfully completing OT and Full Rate Production Decision Review (FRP DR) approval, award production contract in FY2024, as a full and open competition, build to print approach with either a single producer or leader/follower production contract.

E. Performance Metrics

Progress Reviews
Execution Reporting and Reviews
Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*	Project (Number/Name) 1265 / *Sub Defensive Warfare*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS WAF ANALYSIS UDWG	WR	NUWC : NEWPORT, RI	12.514	0.275	Dec 2017	0.280	Dec 2018	0.000	Dec 2019	-		0.000	Continuing	Continuing	Continuing
SubTDS SYSYTEM ENGINEERING	WR	NUWC : NEWPORT, RI	11.640	1.566	Dec 2017	1.095	Dec 2018	1.400	Dec 2019	-		1.400	Continuing	Continuing	Continuing
SubTDS ADC MK5 New Development	C/CPIF	LEIDOS : RESTON, VA	0.000	2.805	Aug 2018	5.266	Dec 2018	2.134	Dec 2019	-		2.134	Continuing	Continuing	Continuing
SubTDS CSA MK5 SYSTEM ENGINEERING	WR	NUWC : KEYPORT, WA	3.015	1.200	Dec 2017	0.700	Dec 2018	1.100	Dec 2019	-		1.100	Continuing	Continuing	Continuing
SubTDS Modeling And Simulation	WR	NUWC : NEWPORT, RI	3.862	1.332	Dec 2017	1.100	Dec 2018	0.700	Dec 2019	-		0.700	Continuing	Continuing	Continuing
SubTDS Tactical Decision Aid TacDA	WR	NUWC : NEWPORT, RI	2.400	1.781	Dec 2017	2.300	Dec 2018	0.400	Dec 2019	-		0.400	Continuing	Continuing	Continuing
Acoustic Augmentation Support Program (AASP)	WR	NUWC : NEWPORT, RI	0.435	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Sabot Development	WR	NUWC : NEWPORT, RI	1.270	0.000		0.000		0.000		-		0.000	0.000	1.270	-
		Subtotal	35.136	8.959		10.741		5.734		-		5.734	Continuing	Continuing	N/A

Remarks

With the restructure of Sub TDS to focus on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the Fleet a zero sum transfer from the sabot development effort diverted FY18 funding of $0.8 million to the SubTDS TacDA ($0.481 million) and to the SBIR assessment ($0.319 million). The FY2019 sabot development funding of $1.0M was transferred to the ADC MK5 contract execution. The restructuring made the program more affordable by diverting funding in a zero sum transfer from the sabot development effort which, as a portion of the SubTDS program will be developed later.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS System Test and Evaluation	WR	NUWC : NEWPORT, RI	0.000	0.000		0.000		0.500	Dec 2019	-		0.500	0.000	0.500	-
		Subtotal	0.000	0.000		0.000		0.500		-		0.500	0.000	0.500	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*	Project (Number/Name) 1265 / *Sub Defensive Warfare*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

SubTDS Developmental Testing begins in FY2020.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SAWS TRAVEL	WR	NAVSEA : Washington, DC	0.692	0.080	Oct 2017	0.070	Oct 2018	0.071	Oct 2019	-		0.071	Continuing	Continuing	Continuing
SubTDS PROGRAM MANAGEMENT SUPPORT	C/CPAF	TECH MARINE : Washington, DC	0.900	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
SubTDS PROGRAM MANAGEMENT SUPPORT	C/CPAF	BOOZ ALLEN : Washington, DC	1.265	0.400	Dec 2017	0.500	Dec 2018	0.510	Dec 2019	-		0.510	Continuing	Continuing	Continuing
		Subtotal	2.857	0.480		0.570		0.581		-		0.581	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	37.993	9.439		11.311		6.815		-		6.815	Continuing	Continuing	N/A

Remarks

The restructure of Sub TDS focuses on delivering full ICL functionality providing the ADC MK5 capability to all submarines in the Fleet.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

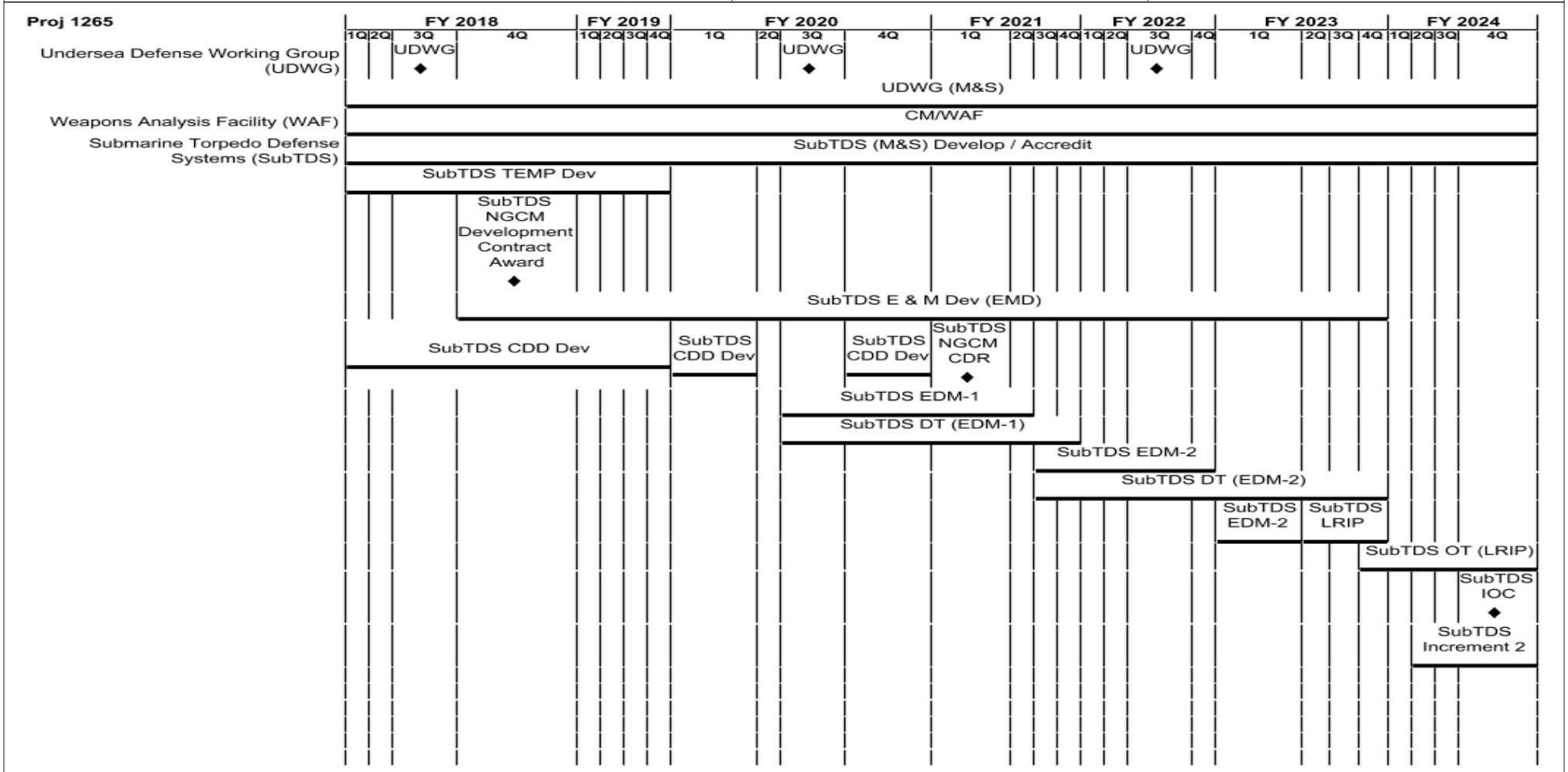

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1265				
Undersea Defense Working Group (UDWG): FY18 UDWG	3	2018	3	2018
Undersea Defense Working Group (UDWG): FY20 UDWG	3	2020	3	2020
Undersea Defense Working Group (UDWG): FY22 UDWG	3	2022	3	2022
Undersea Defense Working Group (UDWG): FY24 UDWG	3	2024	3	2024
Undersea Defense Working Group (UDWG): UDWG Modeling & Simulation (M&S)	1	2018	4	2024
Weapons Analysis Facility (WAF): Countermeasure (CM) Effectiveness/Weapon Analysis Facility (WAF) Vulnerability	1	2018	4	2024
Submarine Torpedo Defense Systems (SubTDS): SubTDS M&S	1	2018	4	2024
Submarine Torpedo Defense Systems (SubTDS): TEMP Development	1	2018	4	2019
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 Devlopment Contract Award	4	2018	4	2018
Submarine Torpedo Defense Systems (SubTDS): Engineering & Manufacturing Development (EMD)	4	2018	4	2023
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 CDD Development	1	2018	4	2019
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 Critical Design Review (CDR)	1	2021	1	2021
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 EDM-1 CDR	1	2020	1	2020
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 EDM-2 CDR	4	2020	4	2020
Submarine Torpedo Defense Systems (SubTDS): EDM-1 Deliveries	3	2020	2	2021
Submarine Torpedo Defense Systems (SubTDS): DT (EDM-1)	3	2020	4	2021
Submarine Torpedo Defense Systems (SubTDS): EDM-2 Deliveries	3	2021	4	2022
Submarine Torpedo Defense Systems (SubTDS): DT (EDM-2)	3	2021	4	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Submarine Torpedo Defense Systems (SubTDS): LRIP Deliveries	2	2023	4	2023
Submarine Torpedo Defense Systems (SubTDS): MS-C Decision Reviews	1	2023	1	2023
Submarine Torpedo Defense Systems (SubTDS): OT (LRIP)	4	2023	4	2024
Submarine Torpedo Defense Systems (SubTDS): IOC	4	2024	4	2024
Submarine Torpedo Defense Systems (SubTDS): Increment 2	2	2024	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0101402N *I Navy Strategic Comms*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	485.264	17.624	38.661	31.174	-	31.174	30.062	27.321	25.072	24.391	Continuing	Continuing
1083: *Shore To Ship Com System*	215.174	16.558	28.559	22.165	-	22.165	20.998	21.390	20.127	20.520	Continuing	Continuing
2959: *Survivable Airborne Strategic Communications*	0.000	0.000	0.000	5.000	-	5.000	5.300	2.150	1.150	0.000	0.000	13.600
3002: *Navy Strategic Comm Project*	270.090	1.066	10.102	4.009	-	4.009	3.764	3.781	3.795	3.871	Continuing	Continuing

A. Mission Description and Budget Item Justification

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	18.221	39.313	24.334	-	24.334
Current President's Budget	17.624	38.661	31.174	-	31.174
Total Adjustments	-0.597	-0.652	6.840	-	6.840
• Congressional General Reductions	-	-0.027			
• Congressional Directed Reductions	-	-0.625			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.055	0.000			
• SBIR/STTR Transfer	-0.511	0.000			
• Program Adjustments	0.000	0.000	6.900	-	6.900
• Rate/Misc Adjustments	-0.001	0.000	-0.060	-	-0.060
• Congressional General Reductions Adjustments	-0.030	-	-	-	-

Change Summary Explanation

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101402N / *Navy Strategic Comms*	Project (Number/Name) 1083 / *Shore To Ship Com System*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1083: *Shore To Ship Com System*	215.174	16.558	28.559	22.165	-	22.165	20.998	21.390	20.127	20.520	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Low Band Universal Communication System (LBUCS)	4.302	7.437	8.761	0.000	8.761
Articles:	-	-	-	-	-
FY 2019 Plans: The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
FY 2020 Base Plans: The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Strategic Communications Assessment Program (SCAP)/Continuing Evaluation Program (CEP)	4.373	6.790	6.640	0.000	6.640
Articles:	-	-	-	-	-
FY 2019 Plans: The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 1083 / *Shore To Ship Com System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: High Voltage Improvement Program (HVIP)	1.538	1.374	1.331	0.000	1.331
Articles:	-	-	-	-	-
FY 2019 Plans: The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 Base Plans:*** The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Navy Modernized Hybrid Solution (NMHS)	3.346	4.869	2.376	0.000	2.376
Articles:	-	-	-	-	-
FY 2019 Plans: The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 Base Plans:*** The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 1083 / *Shore To Ship Com System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Broadcast Control Authority (BCA)	2.999	3.089	3.057	0.000	3.057
Articles:	-	-	-	-	-
FY 2019 Plans: The details of program element 0101402N Project 1083 are classified Secret//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 Base Plans:*** The details of program element 0101402N Project 1083 are classified Secret//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The details of program element 0101402N Project 1083 are classified Secret//NOFORN and are submitted to Congress in the classified budget justification books.					
Title: Take Charge and Move Out (TACAMO)	0.000	5.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 Base Plans:*** The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 1083 / *Shore To Ship Com System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.					
Accomplishments/Planned Programs Subtotals	16.558	28.559	22.165	0.000	22.165

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3107: *Submarine Broadcast*	42.640	25.883	50.833	-	50.833	60.033	59.368	39.312	41.176	Continuing	Continuing

Remarks

D. Acquisition Strategy

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

E. Performance Metrics

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101402N / *Navy Strategic Comms*	Project (Number/Name) 1083 / *Shore To Ship Com System*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	113.430	4.766	Dec 2017	10.985	Dec 2018	8.330	Dec 2019	-		8.330	Continuing	Continuing	Continuing
		Subtotal	113.430	4.766		10.985		8.330		-		8.330	Continuing	Continuing	N/A

Remarks

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	30.366	3.716	Nov 2017	6.758	Nov 2018	4.518	Nov 2019	-		4.518	Continuing	Continuing	Continuing
		Subtotal	30.366	3.716		6.758		4.518		-		4.518	Continuing	Continuing	N/A

Remarks

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	56.319	7.790	Jan 2018	9.508	Jan 2019	8.595	Jan 2020	-		8.595	Continuing	Continuing	Continuing
		Subtotal	56.319	7.790		9.508		8.595		-		8.595	Continuing	Continuing	N/A

Remarks

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101402N / *Navy Strategic Comms*	Project (Number/Name) 1083 / *Shore To Ship Com System*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	TBD	Not Specified : Not Specified	15.059	0.286	Dec 2017	1.308	Dec 2018	0.722	Nov 2019	-		0.722	Continuing	Continuing	Continuing
		Subtotal	15.059	0.286		1.308		0.722		-		0.722	Continuing	Continuing	N/A

Remarks

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	215.174	16.558		28.559		22.165		-		22.165	Continuing	Continuing	N/A

Remarks

The details of program element 0101402N Project 1083 are classified SECRET//NOFORN and are submitted to Congress in the classified budget justification books.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 1083 / *Shore To Ship Com System*

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Proj 1083																												
Schedule Detail- Place Holder																												

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 1083 / *Shore To Ship Com System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1083				
Schedule Detail- Place Holder	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101402N / *Navy Strategic Comms*	Project (Number/Name) 2959 / *Survivable Airborne Strategic Communications*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2959: *Survivable Airborne Strategic Communications*	0.000	0.000	0.000	5.000	-	5.000	5.300	2.150	1.150	0.000	0.000	13.600
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The E-6 is a manned airborne platform that provides survivable, endurable and reliable Command, Control and Communications capability in support of the President, Secretary of Defense and United States strategic and non-strategic forces. In order to respond effectively to emerging capability requirements, continued effort is needed to perform technical evaluations, modeling and simulation, investigative ground and flight testing, enhanced software modifications and development of configuration modifications. Funding is for operational mission analysis and hardware/software engineering required to optimize E-6 systems for cyber security and interoperability in a strategic environment.

E-6B Recapitalization Analysis of Alternative (AoA) funds United States Navy participation in a Joint AoA with United States Air Force to recapitalize the large capacity Executive Airlift and National Military Command System airborne fixed-wing layer fleets, which includes E-6B.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Operational System Development, Studies and Demonstrations	0.000	0.000	5.000	0.000	5.000
Articles:	-	-	-	-	-

FY 2019 Plans:
N/A

FY 2020 Base Plans:
Complete E-6 AoA begun in FY19 with Project Unit 3002 funding ($6.100M in FY19). Prepare and document initial program requirements resulting from AoA. Prepare acquisition planning documentation in support of and initiate initial risk reduction and trade study activities.

FY 2020 OCO Plans:
N/A

FY 2019 to FY 2020 Increase/Decrease Statement:
Increase of $5.000M from FY19 to FY20 is attributable to realignment of E-6B Recapitalization AoA funding from Project Unit 3002 to Project Unit 2959 beginning in FY20.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 2959 / *Survivable Airborne Strategic Communications*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Overall decrease in E-6B Recapitalization AoA funding by $1.100M ($6.100M in FY19 of Project Unit 3002 to $5.000M in FY20 of Project Unit 2959) from FY19 to FY20 is attributable to the ramp down and completion of the E-6B Recapitalization AoA in FY20.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	5.000	0.000	5.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0564: *E-6 Series*	194.391	164.511	169.827	-	169.827	189.593	156.462	126.517	129.447	303.106	2,908.776
• RDTE/ 0101402N/3002: *Navy Strategic Comm Project*	1.066	10.102	4.009	-	4.009	3.764	3.781	3.795	3.871	Continuing	Continuing

Remarks

D. Acquisition Strategy

Research, Development, Test & Evaluation, Navy (RDT&E,N) Project Unit 2959 funds E-6B Recapitalization AoA, Requirement Analyses and Risk Reduction Studies that will occur in FY20-FY23. RDT&E,N Project Unit 3002 funds continuing efforts to perform technical evaluations, modeling & simulation and investigative ground and flight testing. Project Unit 3002 also funds E-6B Recapitalization AoA that will occur in FY19. Aircraft Procurement, Navy, Modification of Aircraft (APN-5) funds integration, procurement and installation of aircraft modifications.

AoA results will be used to define mission concept of operations, system capability requirements, and a preferred material solution. These will form the foundation for an initial acquisition strategy and program life cycle cost estimate in support of program milestone decision review. Trade studies and risk reduction activities will be used to refine the material solution, and derive program and system performance requirements in preparation for development contracts, to be separately funded.

E. Performance Metrics

E-6B Recapitalization AoA 1st Qtr FY20 to 4th Qtr FY20; Requirement Analyses/Risk Reduction 1st Qtr FY20 to 4th Qtr FY23.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101402N / *Navy Strategic Comms*	Project (Number/Name) 2959 / *Survivable Airborne Strategic Communications*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
E-6B Recapitalization Analysis of Alternatives	Various	Various : Various	0.000	0.000		0.000		5.000	Jan 2020	-		5.000	8.600	13.600	-
		Subtotal	0.000	0.000		0.000		5.000		-		5.000	8.600	13.600	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		5.000		-		5.000	8.600	13.600	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 2959 / *Survivable Airborne Strategic Communications*

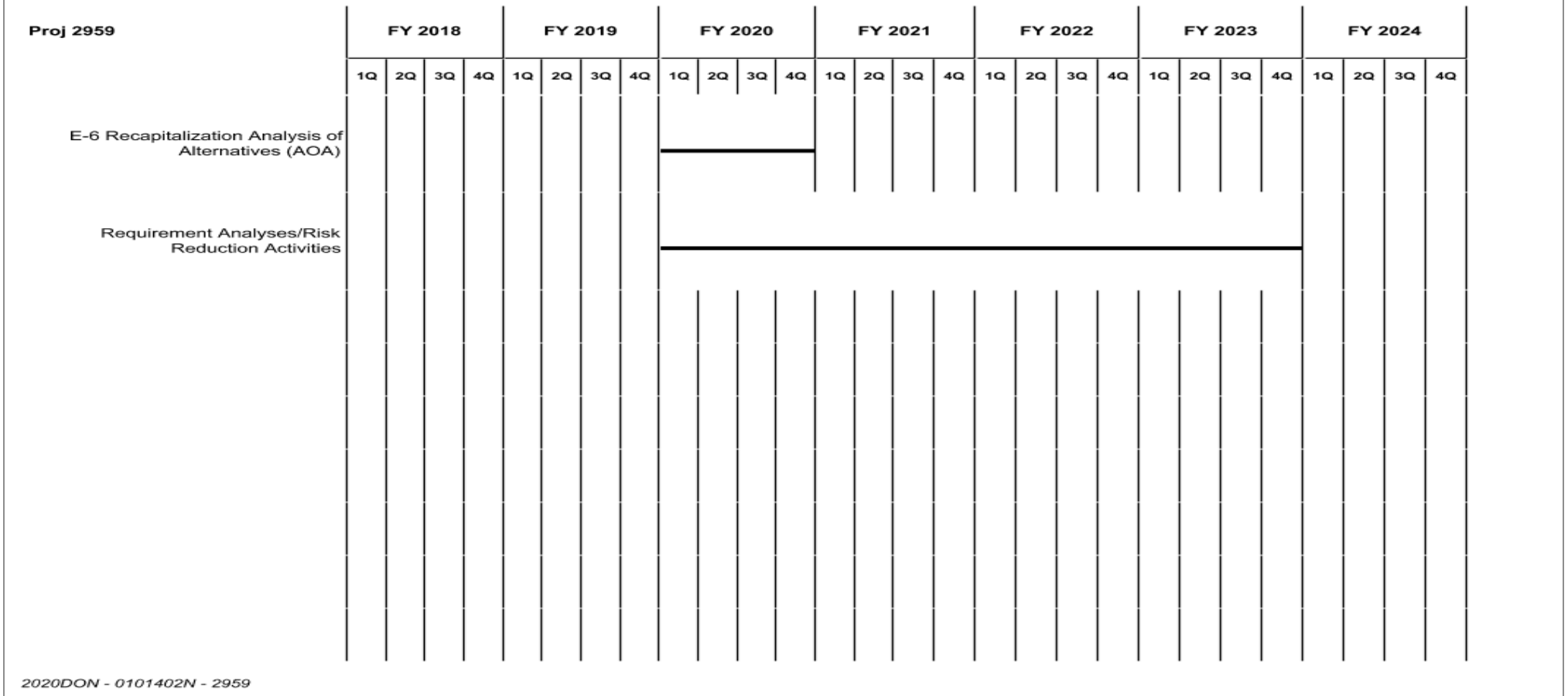

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 2959 / *Survivable Airborne Strategic Communications*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2959				
E-6 Recapitalization Analysis of Alternatives (AOA): E-6B Recapitalization Analysis of Alternatives	1	2020	4	2020
Requirement Analyses/Risk Reduction Activities: Requirement Analyses/Risk Reduction Activities	1	2020	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0101402N / *Navy Strategic Comms*				Project (Number/Name) 3002 / *Navy Strategic Comm Project*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3002: *Navy Strategic Comm Project*	270.090	1.066	10.102	4.009	-	4.009	3.764	3.781	3.795	3.871	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The E-6 is a manned airborne platform that provides survivable, endurable and reliable Command, Control and Communications capability in support of the President, Secretary of Defense and United States strategic and non-strategic forces. In order to respond effectively to emerging capability requirements, continued effort is needed to perform technical evaluations, modeling and simulation, investigative ground and flight testing, enhanced software modifications and development of configuration modifications. Funding is for operational mission analysis and hardware/software engineering required to optimize E-6 systems for cyber security and interoperability in a strategic environment.

E-6B Recapitalization Analysis of Alternatives (AoA) funds United States Navy participation in a Joint AoA with United States Air Force to recapitalize the large capacity Executive Airlift and National Military Command System airborne fixed-wing layer fleets, which includes E-6B.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Operational System Development, Studies and Demonstrations	1.066	10.102	4.009	0.000	4.009
Articles:	-	-	-	-	-
FY 2019 Plans: Perform operational mission analyses and conduct advanced simulations, prototyping, integrations, and demonstrations using the E-6B Systems Integration Laboratory and contractor assets to address system obsolescence and potential upgrades to ensure cyber security software improvements and interoperability of the E-6B platform. Conduct E-6 Recapitalization AoA assessing systems, emergent technologies, and industry Internal Research and Development (IRAD) activities / proposals that can be used across multiple mission areas to reduce risk, development time, and cost. Conduct threat assessments based on current and future scenarios and environments to inform performance requirements and relevant technology. $6.100M of FY19 funding supports the E-6B Recapitalization AoA efforts.					
FY 2020 Base Plans: Perform operational mission analyses and conduct advanced simulations, prototyping, integrations, and demonstrations using the E-6B Systems Integration Laboratory and contractor assets to address system					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 3002 / *Navy Strategic Comm Project*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
obsolescence and potential upgrades to ensure cyber security software improvements and interoperability of the E-6B platform. E-6 Recapitalization AoA and Risk Reduction Studies funding in the amount of $5.000M in FY20 has been realigned under Project Unit 2959, Survivable Airborne Strategic Communications. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $6.093M from FY19 to FY20 is attributable to the movement of $5.000M in FY20 to Project Unit 2959, Survivable Airborne Strategic Communications, to cover the E-6B Recapitalization AoA and Risk Reduction Studies. $6.100M of the $10.102M FY19 Project Unit 3002 funding will cover the commencement of the E-6B Recapitalization AoA.					
Accomplishments/Planned Programs Subtotals	1.066	10.102	4.009	0.000	4.009

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0564: *E-6 Series*	194.391	164.511	169.827	-	169.827	189.593	156.462	126.517	129.447	303.106	2,908.776
• RDTE/0101402N/2959: *Survivable Airborne Strategic Communications*	0.000	0.000	5.000	-	5.000	5.300	2.150	1.150	0.000	0.000	13.600

Remarks

D. Acquisition Strategy

Research, Development, Test & Evaluation, Navy (RDT&E,N) Project Unit 3002 funds continuing efforts to perform technical evaluations, modeling & simulation and investigative ground and flight testing. RDT&E,N Project Unit 3002 also funds E-6B Recapitalization AoA that will occur in FY19. RDT&E,N Project Unit 2959 funds E-6B Recapitalization AoA, Requirement Analyses and Risk Reduction Studies that will occur in FY20-FY23. Aircraft Procurement, Navy, Modification of Aircraft (APN-5) funds integration, procurement and installation of aircraft modifications.

AoA results will be used to define mission concept of operations, system capability requirements, and a preferred material solution. These will form the foundation for an initial acquisition strategy and program life cycle cost estimate in support of program milestone decision review.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 3002 / *Navy Strategic Comm Project*

E. Performance Metrics

E-6B Recapitalization AoA 3rd Qtr FY19 to 4th Qtr FY19. Technical Analysis 1st Qtr FY20, Design Analysis 2nd Qtr FY20, Systems Integration Lab (SIL) Test and Reporting 3rd Qtr FY20.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101402N / *Navy Strategic Comms*	Project (Number/Name) 3002 / *Navy Strategic Comm Project*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Production Development no longer funded in the FYDP	Various	Various : Various	195.224	0.000		0.000		0.000		-		0.000	0.000	195.224	-
Production Development Support	Various	Various : Various	0.000	0.000		0.961	Nov 2018	0.961	Nov 2019	-		0.961	0.000	1.922	-
		Subtotal	195.224	0.000		0.961		0.961		-		0.961	0.000	197.146	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Studies & Analyses	Various	Various: : Various	6.252	0.760	Nov 2017	2.021	Nov 2018	2.033	Nov 2019	-		2.033	Continuing	Continuing	Continuing
E-6B Recapitalization Analysis of Alternatives	Various	Various : Various	0.000	0.000		6.100	Apr 2019	0.000		-		0.000	0.000	6.100	-
		Subtotal	6.252	0.760		8.121		2.033		-		2.033	Continuing	Continuing	N/A

Remarks

E-6B Recapitalization Analysis of Alternatives needs to be a separate Budget Activity 4 and Program Element. Once the new Budget Activity 4 Program Element is created, PU 2959 will be realigned under the new Program Element.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Test & Evaluation cost no longer funded in the FYDP	Various	Various : Various	6.461	0.000		0.000		0.000		-		0.000	0.000	6.461	-
		Subtotal	6.461	0.000		0.000		0.000		-		0.000	0.000	6.461	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101402N / *Navy Strategic Comms*	Project (Number/Name) 3002 / *Navy Strategic Comm Project*

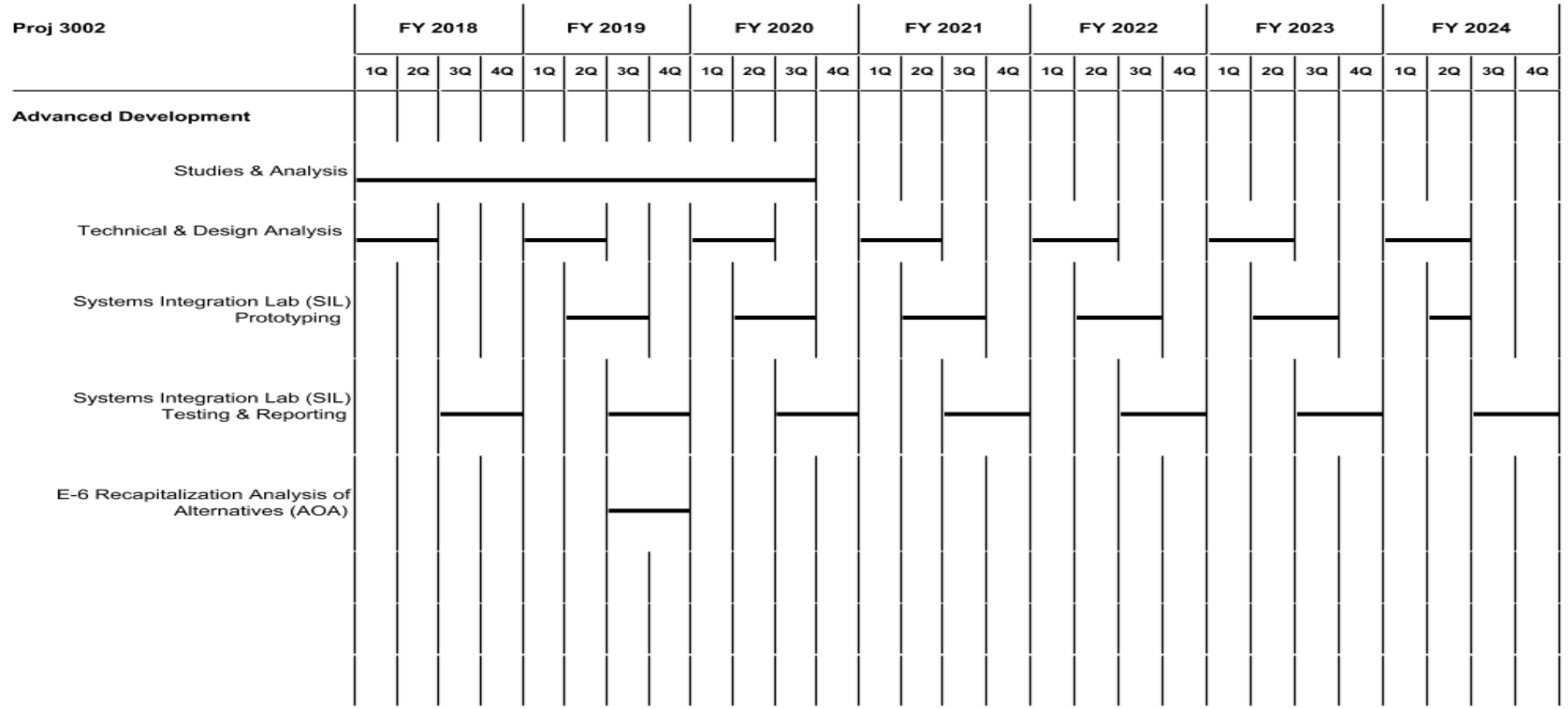
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	Various	Various : various	13.996	0.085	Nov 2017	0.413	Nov 2018	0.407	Nov 2019	-		0.407	Continuing	Continuing	Continuing
Governmental Support	Various	Various : various	35.003	0.046	Nov 2017	0.432	Nov 2018	0.433	Nov 2019	-		0.433	Continuing	Continuing	Continuing
Travel	WR	NAVAIR HQ : Patuxent River, MD	2.556	0.175	Oct 2017	0.175	Oct 2018	0.175	Oct 2019	-		0.175	Continuing	Continuing	Continuing
Prior Year Management cost no longer funded in the FYDP	Various	Various : Various	10.598	0.000		0.000		0.000		-		0.000	0.000	10.598	-
		Subtotal	62.153	0.306		1.020		1.015		-		1.015	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	270.090	1.066		10.102		4.009		-		4.009	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 3002 / *Navy Strategic Comm Project*



2020DON - 0101402N - 3002

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 3002 / *Navy Strategic Comm Project*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3002				
Advanced Development: Studies & Analysis: Studies & Analysis	1	2018	3	2020
Advanced Development: Technical & Design Analysis: Technical & Design Analysis (FY18)	1	2018	2	2018
Advanced Development: Technical & Design Analysis: Technical & Design Analysis (FY19)	1	2019	2	2019
Advanced Development: Technical & Design Analysis: Technical & Design Analysis (FY20)	1	2020	2	2020
Advanced Development: Technical & Design Analysis: Technical & Design Analysis (FY21)	1	2021	2	2021
Advanced Development: Technical & Design Analysis: Technical & Design Analysis (FY22)	1	2022	2	2022
Advanced Development: Technical & Design Analysis: Technical & Design Analysis (FY23)	1	2023	2	2023
Advanced Development: Technical & Design Analysis: Technical & Design Analysis (FY24)	1	2024	2	2024
Advanced Development: Systems Integration Lab (SIL) Prototyping: Systems Integration Lab (SIL) Prototyping (FY19)	2	2019	3	2019
Advanced Development: Systems Integration Lab (SIL) Prototyping: Systems Integration Lab (SIL) Prototyping (FY 20)	2	2020	3	2020
Advanced Development: Systems Integration Lab (SIL) Prototyping: Systems Integration Lab (SIL) Prototyping (FY21)	2	2021	3	2021
Advanced Development: Systems Integration Lab (SIL) Prototyping: Systems Integration Lab (SIL) Prototyping (FY22)	2	2022	3	2022
Advanced Development: Systems Integration Lab (SIL) Prototyping: Systems Integration Lab (SIL) Prototyping (FY23)	2	2023	3	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101402N / *Navy Strategic Comms*	**Project (Number/Name)** 3002 / *Navy Strategic Comm Project*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Advanced Development: Systems Integration Lab (SIL) Prototyping: Systems Integration Lab (SIL) Prototyping (FY24)	2	2024	2	2024
Advanced Development: Systems Integration Lab (SIL) Testing & Reporting: SIL Testing & Reporting (FY18)	3	2018	4	2018
Advanced Development: Systems Integration Lab (SIL) Testing & Reporting: SIL Testing & Reporting (FY19)	3	2019	4	2019
Advanced Development: Systems Integration Lab (SIL) Testing & Reporting: SIL Testing & Reporting (FY20)	3	2020	4	2020
Advanced Development: Systems Integration Lab (SIL) Testing & Reporting: SIL Testing & Reporting (FY21)	3	2021	4	2021
Advanced Development: Systems Integration Lab (SIL) Testing & Reporting: SIL Testing & Reporting (FY22)	3	2022	4	2022
Advanced Development: Systems Integration Lab (SIL) Testing & Reporting: SIL Testing & Reporting (FY23)	3	2023	4	2023
Advanced Development: Systems Integration Lab (SIL) Testing & Reporting: SIL Testing & Reporting (FY24)	3	2024	4	2024
Advanced Development: E-6 Recapitalization Analysis of Alternatives (AOA): E-6B Recapitalization Analysis of Alternatives	3	2019	4	2019

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204136N *I F/A-18 Squadrons*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	5,187.482	133.544	204.886	213.715	-	213.715	169.009	127.070	100.401	94.709	Continuing	Continuing
1662: *F/A-18 Improvement*	4,356.010	68.166	102.938	117.011	-	117.011	130.334	118.228	91.397	85.524	Continuing	Continuing
2065: *F/A-18 Radar Upgrade*	737.378	7.838	7.002	8.706	-	8.706	8.674	8.842	9.004	9.185	Continuing	Continuing
2069: *F/A-18 Infrared Search and Track (IRST)*	94.094	0.078	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	94.172
2071: *F/A-18 Block III*	0.000	57.462	83.146	87.998	-	87.998	30.001	0.000	0.000	0.000	0.000	258.607
9999: *Congressional Adds*	0.000	0.000	11.800	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.800

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): P510

A. Mission Description and Budget Item Justification

The F/A-18 is required to perform multiple missions. The continued F/A-18 E/F and EA-18G "Flight Plan" spiral capability development is critical to the baseline of the Super Hornet next generation mission system capability to maintain the platform's tactical relevance in support of Navy Aviation Plan 2030. Development continues for a platform solution to threat Advanced Electronic Attack and Counter-Electronic Attack (CEA). F/A-18 solutions to CEA include upgrades to existing sensors such as F/A-18 Radar Upgrade, Infrared Search and Track Block I/II, and development of a fused picture between these sensors. Continued advanced development engineering for improvements in reliability and maintainability is required to ensure maximum benefit is achieved through reduced cost of ownership and provides enhanced availability. Capabilities of the F/A-18 weapon system and ancillary equipment can be upgraded to accommodate and incorporate new or enhanced weapons and advances in technology to respond effectively to emerging future threats. Rapid technology insertion upgrades to F/A-18 E/F systems and F/A-18 A-D systems, providing the latest and most current capabilities may be required.

Future integrated Carrier Air Wing Concept of Operations (CONOPS) demand changes to the base line Block II Super Hornet. In response, the Block III Super Hornet was submitted. None of the changes to the aircraft are revolutionary; however, the combined impact to the aircraft's capability and its contribution to the Airwing are significant. The initial F/A-18 Block III concept includes low risk changes which will be incorporated in the near term with a combination of forward fit production line incorporation and retrofit modifications to the aircraft already planned as part of the Service Life Modification (SLM) Plan. The FY 2020 budget requested Non-Recurring (NRE) funds for these ECPs.

USMC upgrades to the platform are being developed; to include integration and capability expansion of AESA Radar for F/A-18 A-D, evaluation and development of an Automatic Ground Collision Avoidance System (AUTOGCAS) for all F/A-18 variants, development of increased sensor and Electronic Warfare (EW) capability for F/A-18 A-D, weapons carriage and employment capability expansion, and enhancement of Mission Computer (MC) processing and memory capability.

Funding is added for Naval Aviation Physiological Episode (PE) mitigation and root cause investigation in aircraft.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204136N *I F/A-18 Squadrons*

Funding for Infrared Search and Track (IRST) (PU 2069) was moved from this Program Element to a new Program Element (PE 0604014N).

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	224.470	193.086	170.095	-	170.095
Current President's Budget	133.544	204.886	213.715	-	213.715
Total Adjustments	-90.926	11.800	43.620	-	43.620
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	11.800			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.865	0.000			
• Program Adjustments	0.000	0.000	40.975	-	40.975
• Rate/Misc Adjustments	-0.001	0.000	2.645	-	2.645
• Congressional General Reductions Adjustments	-0.160	-	-	-	-
• Congressional Directed Reductions Adjustments	-86.900	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *Noise Reduction*	0.000	2.000
Congressional Add: *Navy Joint Air-to-Ground Missile for Fixed Wing Aircraft*	0.000	9.800
Congressional Add Subtotals for Project: 9999	0.000	11.800
Congressional Add Totals for all Projects	0.000	11.800

Change Summary Explanation

Technical:

1662: Funding added for Physiological Episode Mitigation.

2065: Not Applicable
2069: Not Applicable
2071: Not Applicable

Schedule:
1662: MSI program schedule was changed to reflect program execution. Physiological Episode Mitigation, and USMC Capability Upgrades were added to reflect program execution.
2065: Not Applicable
2069: Not Applicable
2071: Block III request for F/A-18E/F capability upgrades Non-recurring Engineering (NRE) funding has been updated to reflect current program status.

The FY 2020 funding request was increased by $44.238 million; $15.000 million for Next Generation Engine (NGE), $29.059 million for Naval Aviation Physiological Episode (PE) mitigation and root cause investigation, and $0.179 million for a rate increase.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 1662 / *F/A-18 Improvement*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1662: *F/A-18 Improvement*	4,356.010	68.166	102.938	117.011	-	117.011	130.334	118.228	91.397	85.524	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The F/A-18 is a multi-mission strike fighter aircraft that is used in Air-to-Air, strike, surveillance, reconnaissance and tanking roles through selected use of external equipment (fuel tanks, tactical and reconnaissance pods, and various ordnance launching racks). Additional capabilities are required for interoperability in a network-centric tactical environment. In order to respond effectively to emerging future threats, F/A-18 aircraft capabilities are being expanded and upgraded to incorporate new/enhanced weapons systems and avionics including Dual Mode Weapons, Counter-Electronic Attack (CEA), Infra-red Search and Track (IRST) integrated with the Active Electronically Scanned Array (AESA) Radar to provide Narrow Band High Gain Electronic Attack and Multi-System Integration. Continued advanced development engineering and analysis of hardware/software is required to successfully optimize fleet F/A-18 weapon systems for interoperability in a network centric tactical environment (such as Naval Integrated Fire Control-Counter Air), to include: enhanced software capabilities, potential new hardware development, enhanced existing hardware, and enhanced network centric capabilities. Additionally, continued effort is needed to perform technical evaluations, modeling and simulations, investigative flight testing, enhanced software modifications based on reported fleet deficiencies and the development and testing of design modifications to address obsolescence issues with the F/A-18 weapon system and ancillary equipment. This funding line continues F/A-18E/F "Flight Plan" spiral capability development, to include Multi-System Integration and further Flight Plan Engineering and System Configuration Set development and integration. This budget continues funding for F/A-18A-F Test Wing Maintenance support and funds development efforts needed for integration of air launched laser guided rockets on F/A-18 A+/C/D. USMC upgrades to the platform are being developed to include evaluation and development of an Automatic Ground Collision Avoidance System (AUTOGCAS) for all F/A-18 variants, development of increased sensor and EW capability for F/A-18 A-D, weapons carriage and employment capability expansion, and enhancement of Mission Computer (MC) processing and memory capability.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: USMC Capability Upgrades	0.000	0.000	31.687	0.000	31.687
Articles:	-	-	-	-	-
Description: USMC upgrades to the platform are being developed to include evaluation and development of an Automatic Ground Collision Avoidance System (AUTOGCAS) for all F/A-18 variants, development of increased sensor and EW capability for F/A-18 A-D, weapons carriage and employment capability expansion, and enhancement of MC processing and memory capability.					
FY 2019 Plans: N/A					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Conduct evaluation and development of AUTOGCAS for all F/A-18 variants. Supports development of increased sensor and EW capability for F/A-18 A-D. Funding supports weapon carriage and employment capability expansion, enhanced MC processing and memory capability, and rapid technology insertion upgrades to F/A-18 A-D to accommodate shifts in technology. AUTOGCAS has high Congressional interest as noted in the FY 2019 NDAA language. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funds are increased for evaluation and development of an AUTOGCAS for all F/A-18 variants and development of increased sensor and EW capability for F/A-18 A-D, capability expansion of weapons carriage and employment capability expansion, and enhanced mission computer processing and memory capability.					
Title: Multi-System Integration (MSI) / Common Tactical Picture (CTP)	45.898	39.891	47.713	0.000	47.713
Articles:	-	-	-	-	-
Description: MSI migrates from the previous Multi-Sensor Integration Phased approach and allows for insertion of new technologies and requirements to keep pace with rapidly evolving warfighter demands. Also, includes a naming convention change in regards to System Configuration Set (SCS) builds 27 and 29. Initially all "X" labeled builds to include Block I Super Hornets, now 27 and 29 will no longer include Super Hornets thus going back to a "C" SCS label designation to include only legacy A-D aircraft. ***FY 2019 Plans:*** Flight Plan MSI of capabilities continues through mission computer, JMPS UPC, and weapon system software SC) updates associated with each incremental Block (H build) software update to include Software Modernization and Cyber. Advances in Super Hornet Air and Surface Warfare will continue with ongoing integration of weapons and sensors into a CTP, Display Improvements to enhance air-to-air and air-to-surface situational awareness and aircrew decision superiority, and Counter Electronic Attack enhancements to improve survivability and lethality. Increased engineering efforts for integration of active and passive kill chain capabilities and sensors associated with Flight Plan NIFC-CA, OASuW and Strike Accelerator FNC Target Identification transition efforts continues. MSI algorithm and sensor developmental efforts also increase at test activities, including ongoing modeling and simulation upgrades such as Net Enabled Weapon Controller Interface Model interoperability software and equipment, and Live Virtual Constructive developmental efforts. Increased Test and Evaluation funding in FY19 provides funding to COTF for MSI OT. ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Flight Plan MSI and associated Common Tactical Picture (CTP) capabilities will continue through mission computer, JMPS UPC, and weapon system software SCS updates associated with each incremental Block (H build) software update to include Software Modernization, Cyber protections, and speed to fleet initiatives. Advances in Super Hornet Air and Surface Warfare will continue with ongoing integration of weapons and sensors into a CTP, Display Improvements to enhance air-to-air and air-to-surface situational awareness and aircrew decision superiority, continued development of third party software applications and protocols for rapid fleet capability delivery, and Counter Electronic Attack enhancements to improve survivability and lethality. Increased engineering efforts for integration of active and passive kill chain capabilities and sensors associated with Flight Plan NIFC-CA and OASuW FNC Target Identification transition efforts continues. Airwing interoperability requirements, CTP algorithm and aircraft division level sensor fusion and management, and developmental test efforts also increase at test activities, including ongoing modeling and simulation upgrades such as Net Enabled Weapon Controller Interface Model interoperability software and equipment, Live Virtual Constructive developmental efforts, and Minotaur research and integration testing. Increased Test and Evaluation funding in FY 2020 provides funding to CTP development and risk reduction, interoperability and testing associated with H16 Operational Testing. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding is increased for the development of Common Tactical Picture (CTP) capability needed to support multi-aircraft sensor management from several sources to derive a more effective targeting solution; improves kill chain lethality.					
Title: Flight Plan Engineering / System Configuration Set Development and Integration	14.568	32.397	7.740	0.000	7.740
Articles:	-	-	-	-	-
Description: Continue F/A-18 E/F and EA-18G "Flight Plan" spiral capability development is critical to the baseline of the Super Hornet next generation mission system capability. Funding will support the development, test and integration efforts required to maintain tactical relevance in support of Navy Aviation Plan 2030. ***FY 2019 Plans:*** Continue Flight Plan Engineering efforts to include F/A-18E/F improvements necessary for Super Hornet relevance and tactical supremacy, Software Modernization and Cyber, Navy Integrated Fire Control-Counter Air system configuration set requirements to support Navy Integrated Air and Missile Defense capability requirements and enhance F/A-18 Cooperative Engagement Capability.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase in FY19 is due to incorporating AESA Multiple Target Tracking Algorithm & Tracking Confirmation, and transitions ONR FNC Strike Accelerator developed target recognition (AiTR) algorithms. Funding supports (hardware and software), test and integration efforts for Flight Plan requirements such as Stationary Target Recognition, Maritime Multiple Target Track and Engagement, Multi-Level Security, Strike Accelerator and Advanced Tactical Data Link; Display Improvements for enhanced sensor integration; Tactical Targeting Network Technology internet protocol capability; Flight Path Control (Magic Carpet); Advanced Targeting Forward Looking Infrared modernization and obsolescence mitigation efforts; and Precision Approach and Landing Capability, in support of Integrated Capability Package 2 and 3. ***FY 2020 Base Plans:*** Continue Flight Plan Engineering efforts to include F/A-18E/F improvements necessary for Super Hornet relevance and tactical supremacy, Software Modernization and Cyber, Navy Integrated Fire Control-Counter Air system configuration set requirements to support Navy Integrated Air and Missile Defense capability requirements and enhanced F/A-18 Cooperative Engagement Capability. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding decrease of $24.557 million is attributable to the realignment of Flight Plan funding into other R-2a budget cost items (i.e., USMC Capability Upgrades).					
Title: Physiological Episode Mitigation	5.100	28.000	27.266	0.000	27.266
Articles:	-	-	-	-	-
Description: Funding provides for design, development, integration and test of platform improvements for F/A-18A-F and EA-18G Weapon Systems to include Naval Aviation Physiological Episode (PE) mitigation and root cause investigation in aircraft (F/A-18A-F and EA-18G). ***FY 2019 Plans:*** Continue studies & development efforts for platform improvements for F/A-18A-F and EA-18G Weapon Systems, including F/A-18 and EA-18G PE mitigation and root cause investigation. ***FY 2020 Base Plans:*** Continue studies & development efforts for platform improvements for F/A-18A-F and EA-18G Weapon Systems, including F/A-18 and EA-18G PE mitigation and root cause investigation. Utilizing a data-driven approach with					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Failure/Fault Tree and closure planning. Will conduct manned and unmanned flight testing as well as Root Cause Analysis (RCCA). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $.614 million is attributable to rate changes.					
Title: Test Wing Maintenance Conversion	2.500	2.550	2.501	0.000	2.501
Articles:	-	-	-	-	-
Description: Funding supports maintenance of aircraft at NAVAIR Test Wing used to support Program Office objectives. ***FY 2019 Plans:*** Perform aircraft maintenance on Test Wing aircraft. ***FY 2020 Base Plans:*** Perform aircraft maintenance on Test Wing aircraft. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funds are increased to reflect annual escalation.					
Title: F/A-18 Obsolescence Redesign	0.100	0.100	0.104	0.000	0.104
Articles:	-	-	-	-	-
Description: Develop and test modifications to address obsolescence issues. ***FY 2019 Plans:*** Develop and test design modifications to hardware components and software systems in response to F/A-18 weapon system and ancillary equipment obsolescence issues. ***FY 2020 Base Plans:*** Develop and test design modifications to hardware components and software systems in response to F/A-18 weapon system and ancillary equipment obsolescence issues. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding was increased to reflect annual escalation.					
Accomplishments/Planned Programs Subtotals	68.166	102.938	117.011	0.000	117.011

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0525: *F-18 SERIES*	1,007.030	1,159.675	1,227.089	-	1,227.089	1,293.248	1,502.252	1,936.725	1,898.026	7,770.655	27,479.309
• RDTEN/3063: *EA-18G DEVELOPMENT*	137.029	147.419	143.585	-	143.585	118.535	67.546	69.981	72.985	Continuing	Continuing
• APN/0145: *FA-18E/F*	1,826.192	1,922.275	1,802.911	-	1,802.911	1,780.868	1,186.989	1,216.228	1,246.678	0.000	55,994.869
• APN/0145C: *FA-18E/F*	52.971	53.977	55.128	-	55.128	28.079	28.640	29.213	29.797	0.000	277.805

Remarks

D. Acquisition Strategy

The F/A-18 Improvement program consists of extensive spiral development efforts mapped out in the capability-based approach F/A-18 E/F "Flight Plan." These efforts are critical to the baseline of the Super Hornet next generation mission system capability and maintaining tactical relevance in support of Navy Aviation Plan 2030. The major programs within the F/A-18 Improvement project are based on multiple Weapon System Capabilities including: Net Centric Operations/Battle Space Management, Sensor Integration, Air to Ground and Maritime Attack, and Air to Air Attack. The major efforts included in this project are: Dual Mode Weapons integration; Multi-System Integration; Common Tactical Picture (CTP); continued advanced development and F/A-18E/F Flight Plan engineering and analysis; continued enhanced software capabilities development; and engineering support to perform technical evaluations, modeling and simulations, and investigative flight testing.
- Multi-System Integration/Common Tactical Picture. Multi-System Integration and Common Tactical Picture capability is being developoed under the NAWCWD System Configuration Set (SCS) Cost plus fixed fee contract.

E. Performance Metrics

Execute the system engineering process for software delivery and support the design, development, integration, and sensor fusion of the contributing systems for MSI capabilities.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 1662 / *F/A-18 Improvement*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Multi System Integration - Develop Sensor Integration	C/IDIQ	Various : Various	9.965	15.157	Feb 2018	17.387	Feb 2019	18.000	Feb 2020	-		18.000	Continuing	Continuing	Continuing
Multi-System Integration Development Support	WR	NAWCWD : China Lake, CA	13.500	14.953	Dec 2017	17.895	Dec 2018	15.410	Dec 2019	-		15.410	0.000	61.758	-
Multi-System Integration Development Support	WR	NAWCAD : Pax River, MD	5.000	7.159	Dec 2017	10.508	Dec 2018	5.999	Dec 2019	-		5.999	0.000	28.666	-
Physiological Episode Mitigation- Development	TBD	Various : Various	0.000	0.000		24.500	Jan 2019	24.680	Jan 2020	-		24.680	0.000	49.180	-
USMC Upgrades - Electronic Warfare	TBD	Raytheon : El Segundo, CA	0.000	0.000		0.000		1.500	Oct 2019	-		1.500	0.000	1.500	1.500
USMC Upgrades - Mission Computer	TBD	General Dynamics : Various	0.000	0.000		0.000		1.000	Oct 2019	-		1.000	0.000	1.000	1.000
USMC Upgrades - Wpns Integration	TBD	Boeing : St Louis, MO	0.000	0.000		0.000		1.500	Oct 2019	-		1.500	0.000	1.500	1.500
USMC Upgrades	WR	NAWCWD : China Lake, CA	0.000	0.000		0.000		8.987	Oct 2019	-		8.987	0.000	8.987	-
USMC Upgrades - AUTOCAS	TBD	Various : Various	0.000	0.000		0.000		18.700	Oct 2019	-		18.700	48.200	66.900	-
Flight Plan / PALC(WAAS)	C/CPFF	Boeing : St. Louis, MO	7.314	1.745	Aug 2018	2.451	Dec 2018	1.890	Dec 2019	-		1.890	0.000	13.400	13.400
Flight Plan/SCS Development	WR	NAWCAD : Pax River, MD	11.647	1.000	Dec 2017	1.020	Dec 2018	1.040	Dec 2019	-		1.040	0.000	14.707	-
Flight Plan/SCS Development (Magic Carpet)	C/CPIF	Boeing : St. Louis, MO	16.697	4.500	Dec 2017	4.000	Dec 2018	1.499	Dec 2019	-		1.499	0.000	26.696	26.696
Flight Plan/SCS Development	Various	DMEA : Various	0.000	4.600	Dec 2017	2.193	Dec 2018	1.000	Dec 2019	-		1.000	0.000	7.793	-
ATFLIR Modernization	TBD	Various : Various	0.740	0.000		0.100	Dec 2018	0.100	Dec 2019	-		0.100	0.000	0.940	-
Prior Year Prod Dev cost no longer funded in FYDP	Various	Various : Various	774.426	0.000		0.000		0.000		-		0.000	0.000	774.426	-
		Subtotal	839.289	49.114		80.054		101.305		-		101.305	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 1662 / *F/A-18 Improvement*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

FY 2020 increased funds are for USMC Capability Upgrades, Physiological Episodes, and Enhanced Engines.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Multi-System Integration Development Support	WR	NSMA : Arlington, VA	6.900	1.679	Mar 2018	1.713	Mar 2019	1.703	Mar 2020	-		1.703	Continuing	Continuing	Continuing
Physiological Episode Mitigation- Support	Various	Various : Various	0.000	4.100	Feb 2018	2.500	Dec 2018	0.500	Dec 2019	-		0.500	6.000	13.100	-
Flight Plan/System Configuration Set Development & Integration	WR	NAWCAD : Pax River, MD	5.777	0.350	Nov 2017	0.307	Nov 2018	0.000		-		0.000	0.000	6.434	-
ATFLIR Modernization - Development Support	WR	NAWCWD : China Lake, CA	0.000	0.000		0.050	Nov 2018	0.000		-		0.000	0.000	0.050	-
Obsolescence Redesign	Various	Various : Various	1.900	0.100	Jun 2018	0.100	Jun 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Prior Year Support costs no longer funded in FYDP	Various	Various : Various	3,106.545	0.000		0.000		0.000		-		0.000	0.000	3,106.545	-
		Subtotal	3,121.122	6.229		4.670		2.203		-		2.203	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Multi-System Integration	WR	OPTEVFOR : Norfolk, VA	1.461	5.100	Dec 2017	10.102	Dec 2018	5.354	Dec 2019	-		5.354	Continuing	Continuing	Continuing
Physiological Episode Mitigation- Test & Evaluation	WR	NMRC : Silver Spring, MD	0.200	1.000	Jan 2018	1.000	Dec 2018	1.000	Dec 2019	-		1.000	1.000	4.200	-
ATFLIR Modernization - Developmental Test	WR	NAWCWD : China Lake, CA	0.000	0.000		0.100	Nov 2018	0.200	Nov 2019	-		0.200	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 1662 / *F/A-18 Improvement*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year T&E costs no longer funded in FYDP	Various	Various : Various	194.414	0.000		0.000		0.000		-		0.000	0.000	194.414	-
		Subtotal	196.075	6.100		11.202		6.554		-		6.554	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Mgmt Support - MISC	Various	NAWCAD : Pax River, MD	16.964	0.659	Dec 2017	0.672	Dec 2018	0.685	Dec 2019	-		0.685	Continuing	Continuing	Continuing
Seaport CSS - Program Management Support	C/CPFF	Wyle Lab : Pax River, MD	27.392	2.453	Dec 2017	2.655	Dec 2018	2.608	Dec 2019	-		2.608	0.000	35.108	35.108
Travel	Various	NAVAIR : Pax River, MD	5.673	0.250	Nov 2017	0.255	Dec 2018	0.260	Dec 2019	-		0.260	Continuing	Continuing	Continuing
Test Wing Maintenance Conversion	WR	NAWCAD : Pax River, MD	34.983	1.250	Dec 2017	1.275	Dec 2018	1.200	Dec 2019	-		1.200	Continuing	Continuing	Continuing
Test Wing Maintenance Conversion	WR	NAWCWD : China Lake, CA	35.909	1.250	Dec 2017	1.275	Dec 2018	1.300	Dec 2019	-		1.300	Continuing	Continuing	Continuing
Flight Plan / System Configuration Set Development & Integration	WR	NAWCAD : Pax River, MD	6.809	0.431	Dec 2017	0.440	Dec 2018	0.448	Dec 2019	-		0.448	Continuing	Continuing	Continuing
Flight Plan / System Configuration Set Development & Integration	WR	NAWCWD : China Lake, CA	6.808	0.430	Dec 2017	0.440	Dec 2018	0.448	Dec 2019	-		0.448	Continuing	Continuing	Continuing
Prior Year Mgmt costs no longer funded in FYDP	Various	Various : Various	64.986	0.000		0.000		0.000		-		0.000	0.000	64.986	-
		Subtotal	199.524	6.723		7.012		6.949		-		6.949	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	4,356.010	68.166		102.938		117.011		-		117.011	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

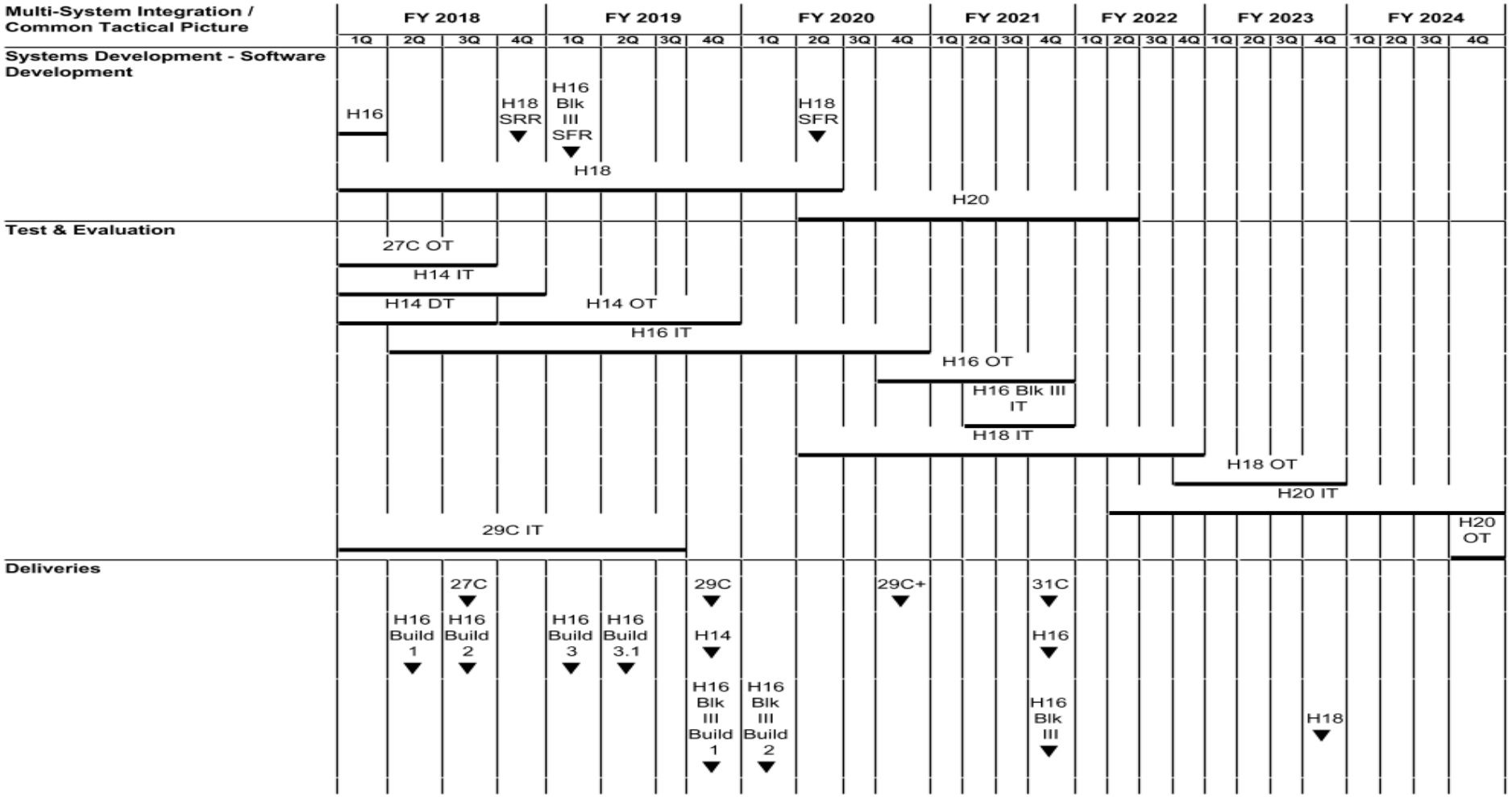
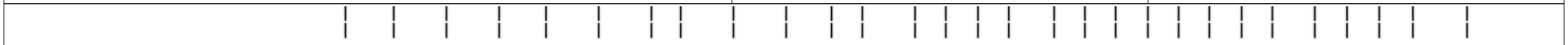
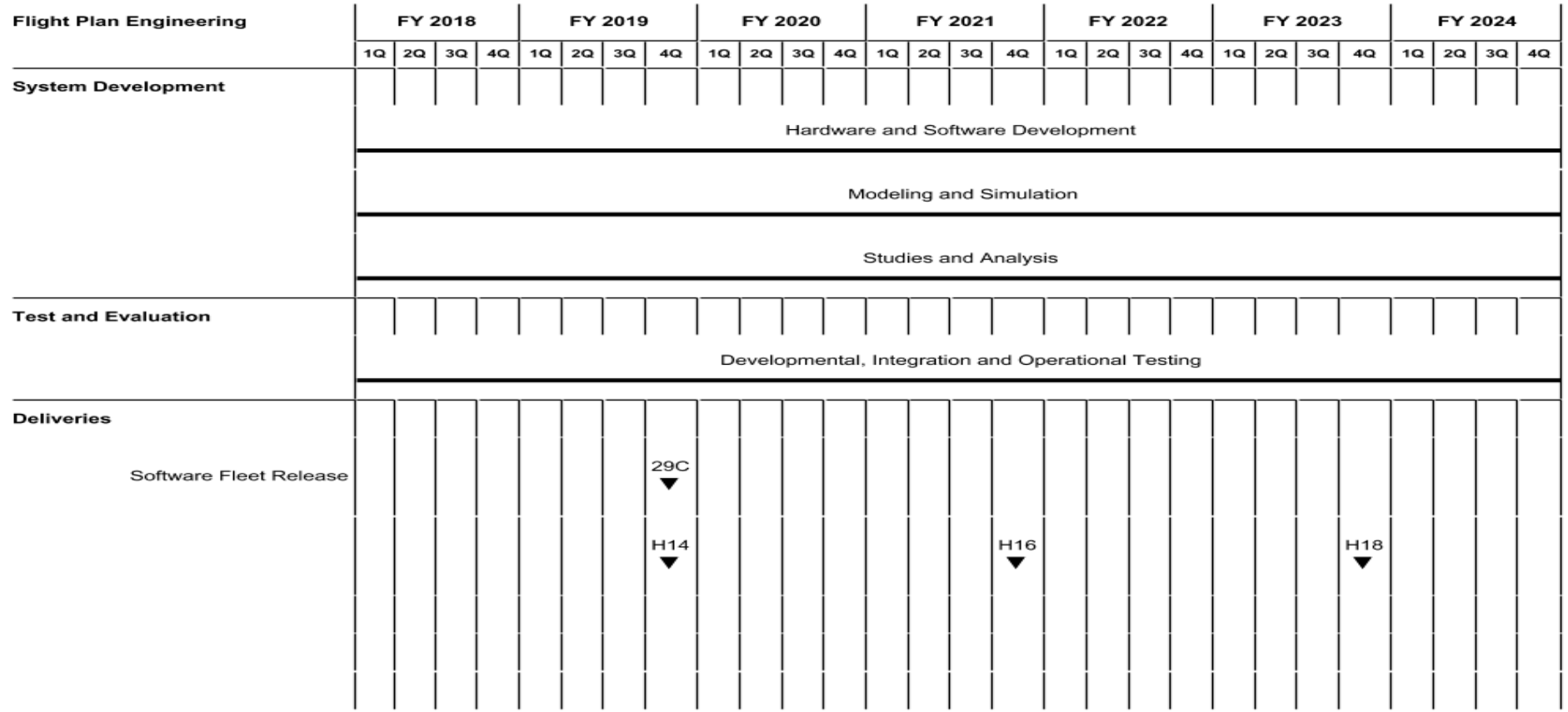


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*



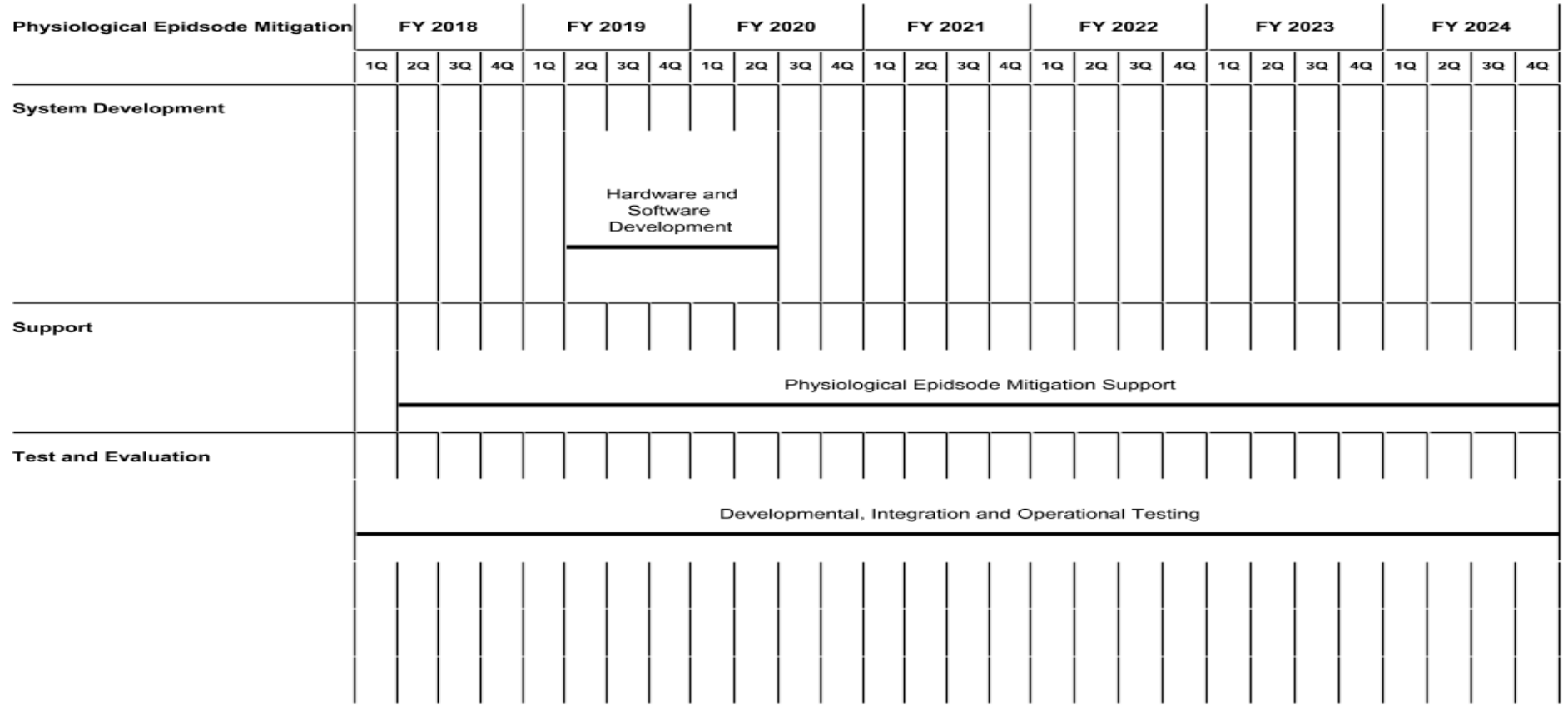
2020OSD - 0204136N - 1662

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*



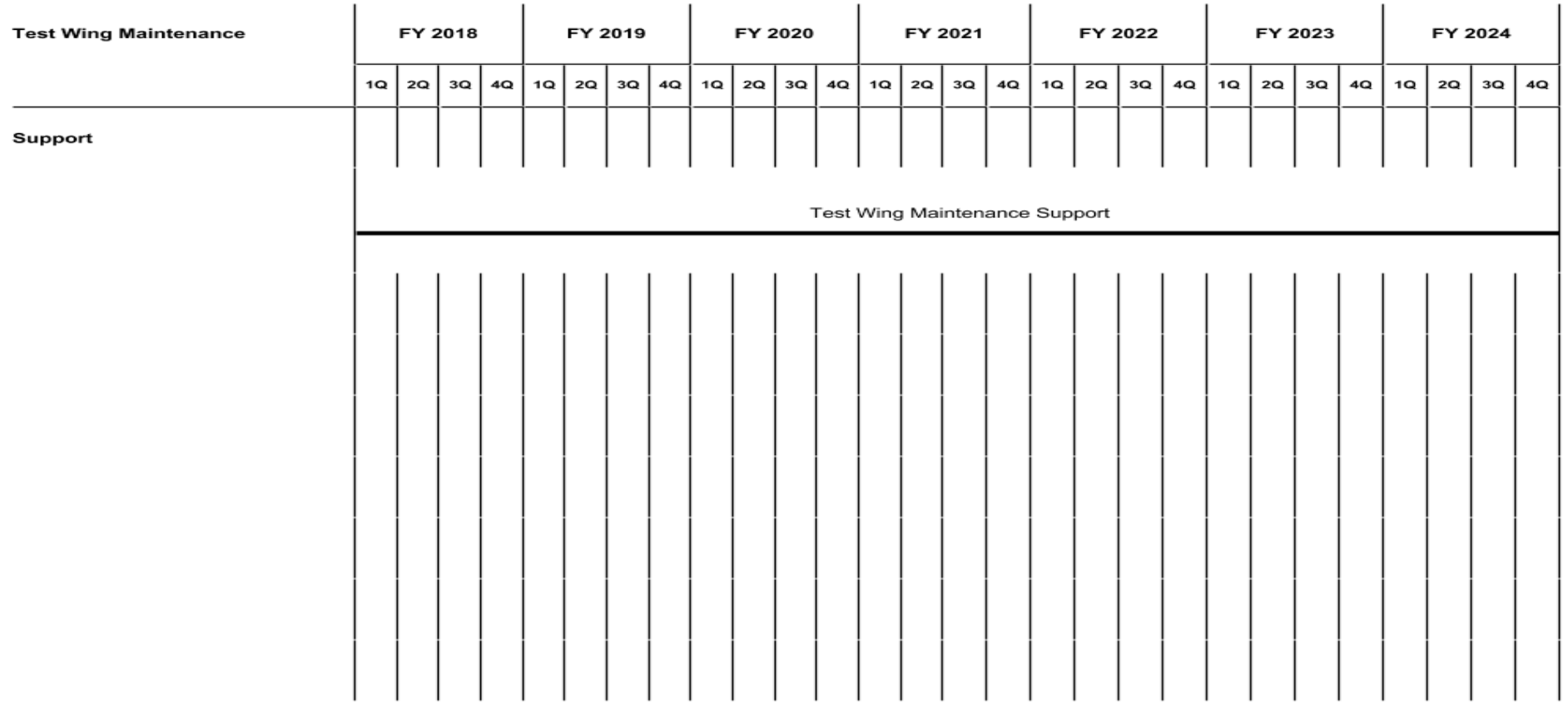
2020OSD - 0204136N - 1662

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*



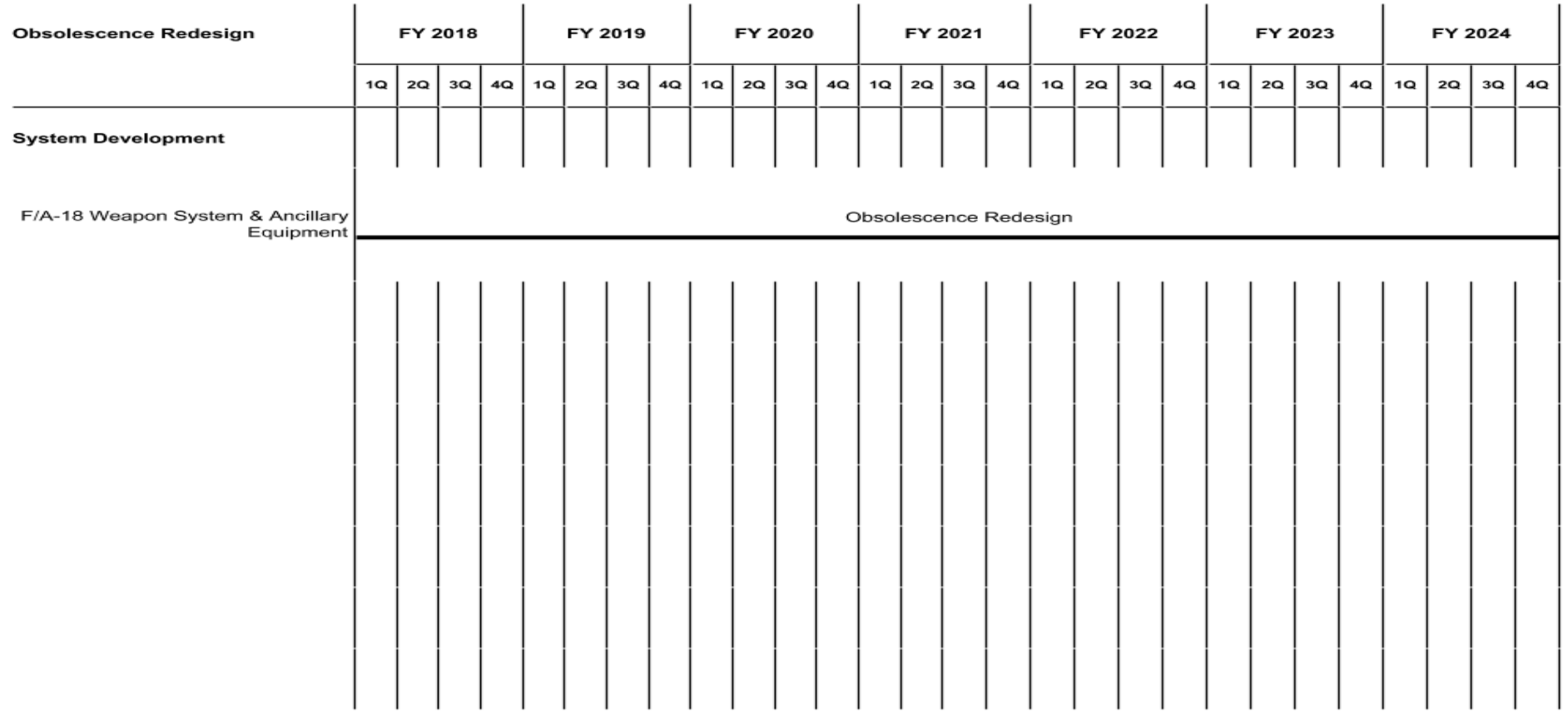
2020OSD - 0204136N - 1662

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*



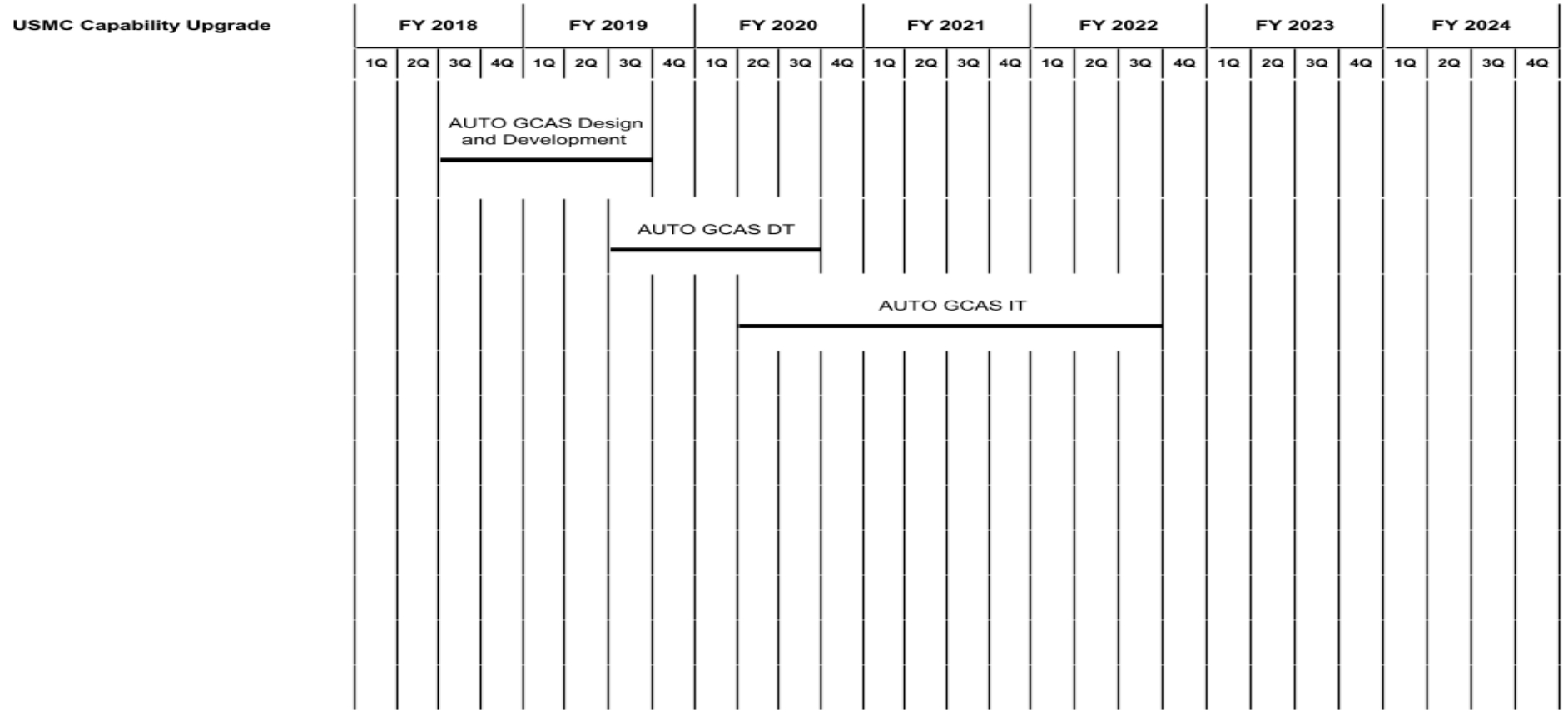
2020OSD - 0204136N - 1662

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*



2020OSD - 0204136N - 1662

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*



2020OSD - 0204136N - 1662

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Multi-System Integration / Common Tactical Picture				
Systems Development - Software Development: H16 Blk III System Functional Review (SFR)	1	2019	1	2019
Systems Development - Software Development: H18 System Requirements Review (SRR)	4	2018	4	2018
Systems Development - Software Development: H18 System Functional Review (SFR)	2	2020	2	2020
Systems Development - Software Development: H16 Software Development	1	2018	1	2018
Systems Development - Software Development: H18 Software Development	1	2018	2	2020
Systems Development - Software Development: H20 Software Development	2	2020	2	2022
Test & Evaluation: 27C Operational Testing	1	2018	3	2018
Test & Evaluation: H14 Integration Testing	1	2018	4	2018
Test & Evaluation: H14 Developmental Testing	1	2018	3	2018
Test & Evaluation: H14 Operational Testing	4	2018	4	2019
Test & Evaluation: H16 Integration Testing	2	2018	4	2020
Test & Evaluation: H16 Operational Testing	4	2020	4	2021
Test & Evaluation: H16 Blk III Integration Testing	2	2021	4	2021
Test & Evaluation: H18 Integration Testing	2	2020	4	2022
Test & Evaluation: H18 Operational Testing	4	2022	4	2023
Test & Evaluation: H20 Integration Testing	2	2022	4	2024
Test & Evaluation: H20 Operational Testing	4	2024	4	2024
Test & Evaluation: 29C Integration Testing	1	2018	3	2019
Deliveries: 27C Fleet Release	3	2018	3	2018
Deliveries: 29C Fleet Release	4	2019	4	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Deliveries: 29C+ Fleet Release	4	2020	4	2020
Deliveries: 31C Fleet Release	4	2021	4	2021
Deliveries: H14 Fleet Release	4	2019	4	2019
Deliveries: H16 Build 1	2	2018	2	2018
Deliveries: H16 Build 2	3	2018	3	2018
Deliveries: H16 Build 3	1	2019	1	2019
Deliveries: H16 Build 3.1	2	2019	2	2019
Deliveries: H16 Fleet Release	4	2021	4	2021
Deliveries: H16 Blk III Build 1	4	2019	4	2019
Deliveries: H16 Blk III Build 2	1	2020	1	2020
Deliveries: H16 Blk III Fleet Release	4	2021	4	2021
Deliveries: H18 Fleet Release	4	2023	4	2023
Flight Plan Engineering				
System Development: Hardware and Software Development	1	2018	4	2024
System Development: Modeling and Simulation	1	2018	4	2024
System Development: Studies and Analysis	1	2018	4	2024
Test and Evaluation: Developmental, Integration and Operational Testing	1	2018	4	2024
Deliveries: Software Fleet Release: 29C Fleet Release	4	2019	4	2019
Deliveries: Software Fleet Release: H14 Fleet Release	4	2019	4	2019
Deliveries: Software Fleet Release: H16 Fleet Release	4	2021	4	2021
Deliveries: Software Fleet Release: H18 Fleet Release	4	2023	4	2023
Physiological Epidsode Mitigation				
System Development: Hardware and Software Development	2	2019	2	2020
Support: Physiological Epidsode Mitigation Support	2	2018	4	2024
Test and Evaluation: Developmental, Integration and Operational Testing	1	2018	4	2024
Test Wing Maintenance				

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 1662 / *F/A-18 Improvement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Support: Test Wing Maintenance Support	1	2018	4	2024
Obsolescence Redesign				
System Development: F/A-18 Weapon System & Ancillary Equipment: Obsolescence Redesign Development & Testing	1	2018	4	2024
USMC Capability Upgrade				
AUTO GCAS Design and Development	3	2018	3	2019
AUTO GCAS DT	3	2019	3	2020
AUTO GCAS IT	2	2020	3	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2065 / *F/A-18 Radar Upgrade*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2065: *F/A-18 Radar Upgrade*	737.378	7.838	7.002	8.706	-	8.706	8.674	8.842	9.004	9.185	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

F/A-18 Radio Detection and Ranging (RADAR) Upgrade: The F/A-18 RADAR Upgrade, Active Electronically Scanned Array (AESA) development program, which began in FY 1999, is the last of three pre-planned upgrades to the F/A-18 Type/Model/Series RADAR. The AESA system corrects operational test deficiencies noted in the AN/APG-73. It provides multi-target tracking, Synthetic Aperture RADAR (SAR) imagery, SAR Target Location Error (TLE), and improved spotlight map resolution. In addition, it provides greater lethality than previous F/A-18 RADARs by allowing full tactical support of existing and planned air-to-air (A/A) and air-to-ground (A/G) weapons and it significantly increases A/A and A/G detection and tracking ranges. The AESA system provides greater survivability through self-protection and standoff jamming capabilities, while its greater range allows for reduced detection by enemy RADAR. This budget continues spiral capability development of AESA with increased efforts to address Phase II Operational Requirements Document requirements such as Counter-Electronic Attack(CEA) against multiple Radio Frequency Emitters, AESA Multi-Jammer Electronic Protection, Precision TLE Improvement, Monopulse and 5th/6th Channel development and Air Combat Maneuvering/Short Range Search and Track development and includes upgrades to RADAR Instrumentation, test and evaluation assets and threat assets, and upgraded modeling and simulation of both clean and Electronic Attack threat environments. This budget request supports development and testing of design modifications to address obsolescence issues with APG-65, APG-73 and APG-79 RADAR systems. USMC upgrades to the platform are being developed to include capability expansion of AESA Radar for F/A-18 A-D.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Distributed Targeting - CEA Software Development, Developmental Testing, Operational Testing, & Integration	6.939	6.085	7.549	0.000	7.549
Articles:	-	-	-	-	-
Description: Funding being utilized to support hardware (HW) and software (SW) capabilities development, integration and associated testing.					
FY 2019 Plans: Continue HW/SW development, integration and testing of instrumentation required to support AESA RADAR spiral capability upgrades. Funds engineering efforts associated with software development and integration of active and passive kill chain capabilities and sensors into the AESA Radar in support of CEA. H14 Operational testing and H16 Integration testing starts in FY18 and continues into FY19.					
FY 2020 Base Plans: Continued HW/SW development, integration and testing of instrumentation required to support AESA RADAR spiral capability upgrades. Funds engineering efforts for software development and integration of active and					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2065 / *F/A-18 Radar Upgrade*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
passive kill chain capabilities and sensors into the AESA Radar in support of CEA. Funding supports USMC capability upgrades for integration and capability expansion of AESA Radar for F/A-18 A-D. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding increase of $1.509 million for H16 CEA software development requirements that provide additional active and passive kill chain capabilities.					
Title: F/A-18 RADAR Obsolescence Redesign	0.899	0.917	1.157	0.000	1.157
Articles:	-	-	-	-	-
Description: Funding provided for development and design modifications to address obsolescence issues in the RADAR. ***FY 2019 Plans:*** Develop and test design modifications to hardware components and software systems in response to F/A-18 RADAR system obsolescence issues. ***FY 2020 Base Plans:*** Continued development and test design modifications to hardware components and software systems in response to F/A-18 RADAR system obsolescence issues. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding was increased by $.240 million for RADAR obsolescence issues.					
Accomplishments/Planned Programs Subtotals	7.838	7.002	8.706	0.000	8.706

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/05250: *F-18 Series Mod (OSIP 002-07)*	74.052	150.117	160.304	-	160.304	72.544	62.209	142.941	145.801	3.799	1,964.696
• APN/0145: *FA-18E/F*	1,826.192	1,922.275	1,802.911	-	1,802.911	1,780.868	1,186.989	1,216.228	1,246.678	0.000	55,994.869
• APN/0145C: *FA-18E/F*	52.971	53.977	55.128	-	55.128	28.079	28.640	29.213	29.797	0.000	277.805

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2065 / *F/A-18 Radar Upgrade*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

The Active Electronically Scanned Array program continues developmental efforts following a successful Full Rate Production milestone decision, after completing a two-phase Acquisition approach during the FY 1999 through FY 2007 timeframe. This strategy continues utilization of reform initiatives such as: early partnering with industry; leveraging industry investment; optimizing use of Commercial Off-The Shelf software and Non-Developmental Item; using Cost as an Independent Variable; and Electronic Data Deliverables. Basic Ordering Agreement orders for Request for Proposal developments are in place for Boeing, the airframe prime manufacturer/ integrator, and Raytheon, the Radio Detection and Ranging RADAR manufacturer, for focused risk reduction and sustainment of prior developmental activities.

E. Performance Metrics

Execute the system engineering process for software delivery and support the design and development of Electronic Protection, air to air, and air to ground capabilities.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2065 / *F/A-18 Radar Upgrade*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCAD : Pax River, MD	8.264	1.915	Nov 2017	1.374	Nov 2018	2.446	Nov 2019	-		2.446	Continuing	Continuing	Continuing
CEA - Development/ Integration Counter Electronic Attack (CEA)	Various	NSMA : Arlington, VA	82.624	2.645	Dec 2017	2.333	Dec 2018	2.322	Dec 2019	-		2.322	Continuing	Continuing	Continuing
Systems Engineering - Capabilities	WR	NAWCWD : China lake, CA	0.000	1.000	Dec 2017	1.020	Dec 2018	1.400	Dec 2019	-		1.400	0.000	3.420	-
Hardware-Obsolescence	MIPR	DMEA : Sacramento, CA	2.375	0.899	May 2018	0.917	May 2019	1.157	May 2020	-		1.157	Continuing	Continuing	Continuing
Prior Year Prod Dev cost no longer funded in FYDP	Various	Various : Various	468.195	0.000		0.000		0.000		-		0.000	0.000	468.195	-
		Subtotal	561.458	6.459		5.644		7.325		-		7.325	Continuing	Continuing	N/A

Remarks

Funding increased for additional CEA engineering support at NAWCAD, Patuxent River, Maryland.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development (Instrumentation)	WR	NAWCWD : China Lake, CA	44.423	0.150	Dec 2017	0.153	Dec 2018	0.156	Dec 2019	-		0.156	Continuing	Continuing	Continuing
Chamber Support	WR	NSMA : Arlington, VA	0.000	0.500	Dec 2017	0.510	Dec 2018	0.520	Dec 2019	-		0.520	0.000	1.530	-
Obsolescence Redesign	Various	Various : Various	0.370	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prior Year Support cost no longer funded in the FYDP	Various	Various : Various	2.027	0.000		0.000		0.000		-		0.000	0.000	2.027	-
		Subtotal	46.820	0.650		0.663		0.676		-		0.676	Continuing	Continuing	N/A

Remarks

Chamber Support: Funding is for (test) chamber support; supports testing of CEA and software capabilities on the RADAR.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2065 / *F/A-18 Radar Upgrade*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Operational Test	WR	NAWCWD : China Lake, CA	0.300	0.150	Dec 2017	0.121	Dec 2018	0.130	Dec 2019	-		0.130	Continuing	Continuing	Continuing
Prior Year T&E cost no longer funded in FYDP	Various	Various : Various	111.911	0.000		0.000		0.000		-		0.000	0.000	111.911	-
		Subtotal	112.211	0.150		0.121		0.130		-		0.130	Continuing	Continuing	N/A

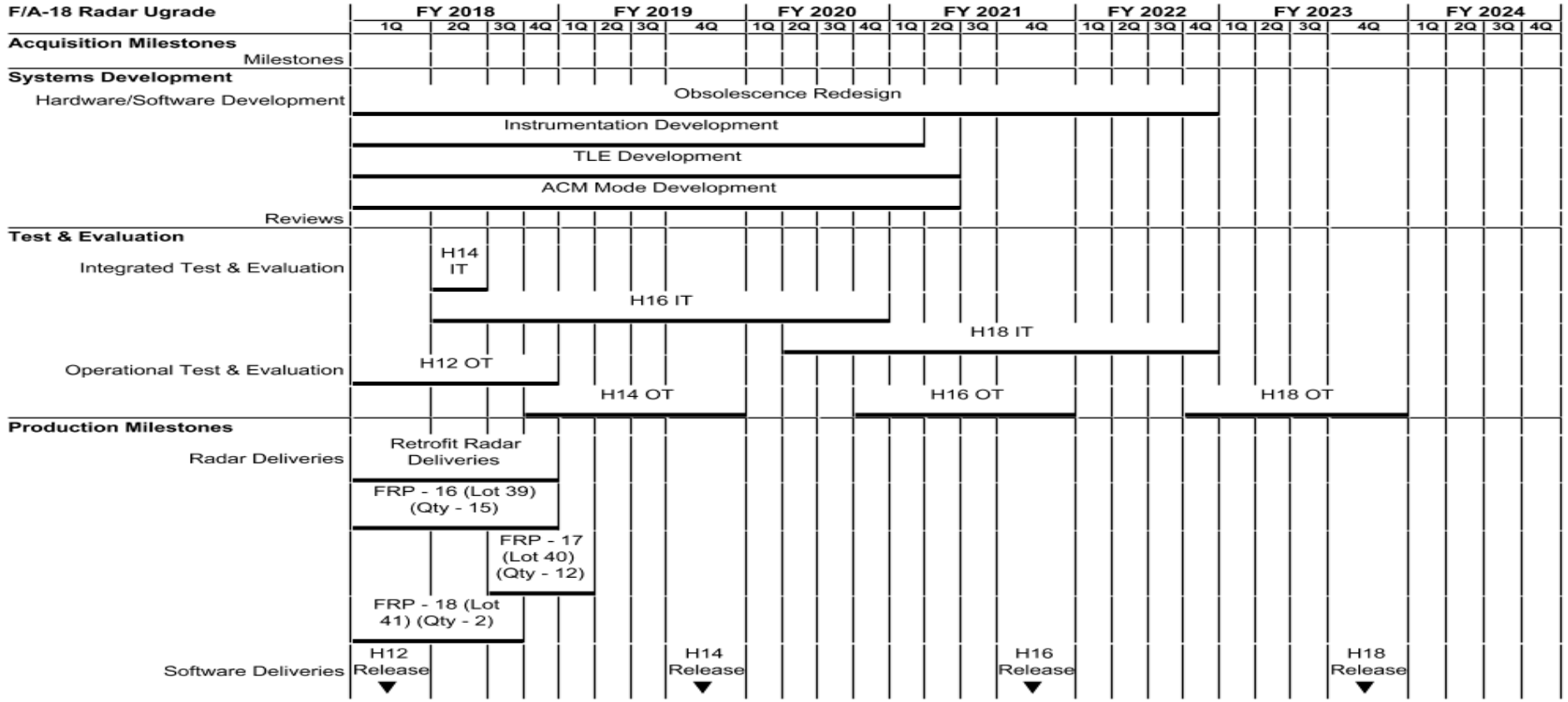
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support (Seaport CSS)	C/CPFF	Wyle : Pax River, MD	8.643	0.414	Dec 2017	0.422	Dec 2018	0.423	Dec 2019	-		0.423	0.000	9.902	9.902
Contractor Engineering Support	Various	Various : Various	3.096	0.018	Dec 2017	0.018	Dec 2018	0.018	Dec 2019	-		0.018	0.000	3.150	-
Program Management Support	WR	NAWCAD : Pax River, MD	3.314	0.101	Dec 2017	0.087	Dec 2018	0.087	Dec 2019	-		0.087	0.800	4.389	-
Travel	Various	NAVAIR : Pax River, MD	1.836	0.046	Nov 2017	0.047	Nov 2018	0.047	Nov 2019	-		0.047	0.000	1.976	-
		Subtotal	16.889	0.579		0.574		0.575		-		0.575	0.800	19.417	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	737.378	7.838		7.002		8.706		-		8.706	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2065 / *F/A-18 Radar Upgrade*



2020OSD - 0204136N - 2065

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2065 / *F/A-18 Radar Upgrade*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
F/A-18 Radar Ugrade				
Systems Development: Hardware/Software Development: Obsolescence Redesign Development & Testing	1	2018	4	2022
Systems Development: Hardware/Software Development: Instrumentation Development	1	2018	1	2021
Systems Development: Hardware/Software Development: TLE Development	1	2018	2	2021
Systems Development: Hardware/Software Development: ACM Mode Development	1	2018	2	2021
Test & Evaluation: Integrated Test & Evaluation: H14 Integration Testing	2	2018	2	2018
Test & Evaluation: Integrated Test & Evaluation: H16 Integration Testing	2	2018	4	2020
Test & Evaluation: Integrated Test & Evaluation: H18 Integration Testing	2	2020	4	2022
Test & Evaluation: Operational Test & Evaluation: H12 Operational Testing	1	2018	4	2018
Test & Evaluation: Operational Test & Evaluation: H14 Operational Testing	4	2018	4	2019
Test & Evaluation: Operational Test & Evaluation: H16 Operational Testing	4	2020	4	2021
Test & Evaluation: Operational Test & Evaluation: H18 Operational Testing	4	2022	4	2023
Production Milestones: Radar Deliveries: Retrofit Radar Deliveries	1	2018	4	2018
Production Milestones: Radar Deliveries: FRP Deliveries B - 16 (Lot 39)	1	2018	4	2018
Production Milestones: Radar Deliveries: FRP Deliveries B - 17 (Lot 40)	3	2018	1	2019
Production Milestones: Radar Deliveries: FRP Deliveries B - 18 (Lot 41)	1	2018	3	2018
Production Milestones: Software Deliveries: H12 FLEET RELEASE	1	2018	1	2018
Production Milestones: Software Deliveries: H14 FLEET RELEASE	4	2019	4	2019
Production Milestones: Software Deliveries: H16 FLEET RELEASE	4	2021	4	2021
Production Milestones: Software Deliveries: H18 FLEET RELEASE	4	2023	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2069 / *F/A-18 Infrared Search and Track (IRST)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2069: *F/A-18 Infrared Search and Track (IRST)*	94.094	0.078	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	94.172
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: P510

Note

Proj: 2069 F/A-18 Infrared Search and Track (IRST) has been transferred to a stand alone Program Element 0604014N F/A-18 Infrared Search and Track (IRST) beginning in FY18.

A. Mission Description and Budget Item Justification

F/A-18 Infra-Red Search and Track (IRST): The F/A-18 E/F IRST system is a passive long-wave Infra-Red (IR) sensor which provides an alternate fire control system in a high Electronic Attack / Radio Detection and Ranging (RADAR) denied environment. The IRST Block II Engineering Change Proposal (ECP) upgrades two Weapons Replaceable Assemblies (WRAs); the Infra-Red Receiver (IRR) and processor in order to provide full Capabilities Development Document (CDD) capability and enhanced warfighting capability through an improved engagement timeline, improved situational awareness, longer range passive detection and tracking and a larger field of regard with specification performance.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Infra-Red Search and Track (IRST)	0.078	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Technology development and engineering and manufacturing development of an IRST sensor for the F/A-18 E/F. Block I supported technology development and engineering and manufacturing development of an IRST sensor for the F/A-18E/F to provide an alternate fire control system in a high Electronic Attack / Radio Detection and Ranging (RADAR) denied environment. Block I systems currently in production will be utilized as test assets for continued integration, tactics development and aircrew familiarization; will be upgraded via retrofit to a Block II configuration prior to fleet delivery. Block II IRST upgrades the Infra-Red Receiver (IRR) and processor to provide full Capabilities Development Document (CDD) capability and enhanced warfighting capability through an improved engagement timeline, improved situational awareness, longer range passive detection and tracking and a larger field of regard with specification performance.					
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2069 / *F/A-18 Infrared Search and Track (IRST)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	0.078	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/05250: *F-18 Series Mod (OSIP 04-14)*	134.034	60.195	0.000	85.835	85.835	185.110	229.598	199.719	208.859	321.601	1,582.317

Remarks

D. Acquisition Strategy

Infra-Red Search and Track (IRST). The IRST system is an evolutionary Navy acquisition program with Block I and Block II capabilities. The IRST Block I system developed by the Navy provides a basic capability, supported integration of the sensor onto a fuel tank and into the aircraft and supported aeromechanical flight test required for clearance and carrier qualification of the system. IRST Block I is in the Production and Deployment phase following a successful MS-C decision in December 2014 and will support continued integration with the F/A-18E/F Advanced Mission Computer software through flight testing with System Configuration Sets H14 and H16.

IRST Block II is an ECP to upgrade two WRAs that will provide full CDD capability. Early risk reduction activities were initiated in FY2016, the program executed a pre-development In Progress Review (IPR 1) in October 2017 and has a planned pre-production IPR (IPR 2) scheduled for 4th Quarter FY2018 leading to a planned low rate initial production (APN-5 funded) start in FY2019 to achieve an Initial Operating Capability (IOC) in 4th Quarter FY2021.

E. Performance Metrics

IRST Program achieved MS B on 17 June 2011, achieved MS C on 02 December 2014. IRST Block II Pre-Development IPR-1 was conducted 1st Quarter 2018; Pre-Production IPR-2 is scheduled for 4th Quarter FY2018.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2069 / *F/A-18 Infrared Search and Track (IRST)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Development (Hardware/Software) Infra-Red Search and Track (IRST)	Various	Boeing : St. Louis, MO	36.266	0.000		0.000		0.000		-		0.000	0.000	36.266	36.266
Hardware Development	MIPR	USAF (MIT) : Hanscom AFB, MA	0.522	0.000		0.000		0.000		-		0.000	0.000	0.522	-
Software (S/W) Development	WR	NAWCWD : China Lake, CA	5.283	0.000		0.000		0.000		-		0.000	0.000	5.283	-
IRST Support Equipment Development	WR	NAWCAD : Lakehurst, NJ	0.047	0.000		0.000		0.000		-		0.000	0.000	0.047	-
Primary Development	Various	NSMA : Various	40.156	0.000		0.000		0.000		-		0.000	0.000	40.156	-
		Subtotal	82.274	0.000		0.000		0.000		-		0.000	0.000	82.274	N/A

Remarks

NAWCAD Lakehurst, New Jersey, is developing Support Equipment necessary to support the IRST pods. Block II EMD effort ramps up significantly in FY 2019 to support alignment with H16 development and testing in order to achieve IOC in FY 2021.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	WR	NAWCWD : China Lake, CA	1.133	0.000		0.000		0.000		-		0.000	0.000	1.133	-
Development Support	WR	NAWCAD : Patuxent River, MD	2.239	0.000		0.000		0.000		-		0.000	0.000	2.239	-
Development Support	WR	NSWC : Indian Head, MD	0.060	0.000		0.000		0.000		-		0.000	0.000	0.060	-
Development Support	WR	NAWCWD : Pt. Mugu, CA	0.022	0.000		0.000		0.000		-		0.000	0.000	0.022	-
Development Support	WR	FRC Southeast : Jacksonville, FL	0.917	0.000		0.000		0.000		-		0.000	0.000	0.917	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2069 / *F/A-18 Infrared Search and Track (IRST)*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	C/CPFF	NRL : Washington, DC	0.338	0.000		0.000		0.000		-		0.000	0.000	0.338	0.338
Development Support	WR	NAVSUP : Mechanicsburg, PA	0.040	0.000		0.000		0.000		-		0.000	0.000	0.040	-
Obsolescence Redesign	Various	Various : Various	0.250	0.000		0.000		0.000		-		0.000	0.000	0.250	-
		Subtotal	4.999	0.000		0.000		0.000		-		0.000	0.000	4.999	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation (DT&E)	WR	NAWCAD : Patuxent River, MD	1.183	0.000		0.000		0.000		-		0.000	0.000	1.183	-
Developmental Test & Evaluation (DT&E)	WR	NAWCWD : China Lake, CA	5.337	0.000		0.000		0.000		-		0.000	0.000	5.337	-
Operational Test & Evaluation (OT&E) - CSS	Various	OPTEVFOR : VX-9	0.106	0.000		0.000		0.000		-		0.000	0.000	0.106	-
Operational Test & Evaluation (OT&E) - CSS	Various	OPTEVFOR : Norfolk, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	6.626	0.000		0.000		0.000		-		0.000	0.000	6.626	N/A

Management Services ($ in Millions)

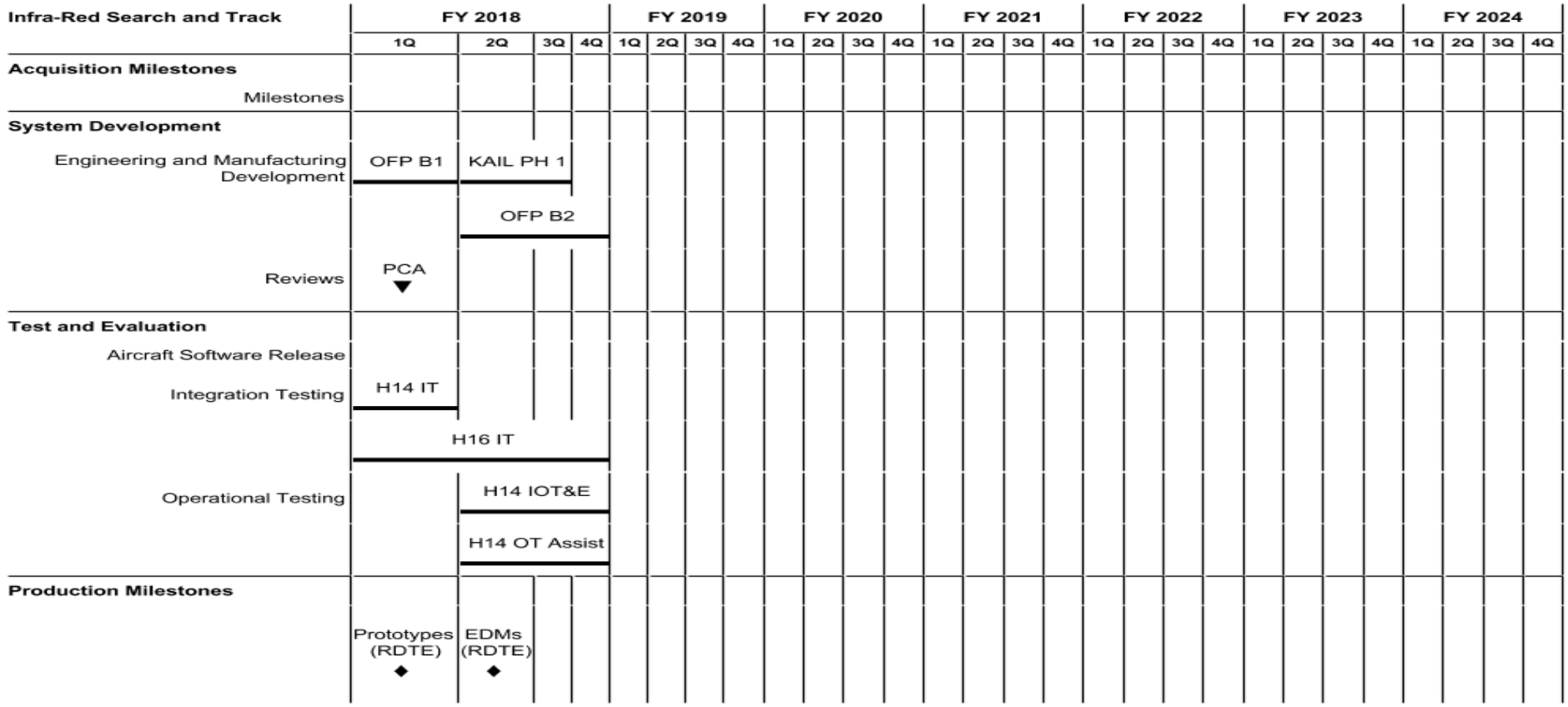
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Various	NAVAIR : Patuxent River, MD	0.020	0.000		0.000		0.000		-		0.000	0.000	0.020	-
Program Management Support - MISC	Various	NAWCAD : Patuxent River, MD	0.175	0.078	Oct 2017	0.000		0.000		-		0.000	0.000	0.253	-
		Subtotal	0.195	0.078		0.000		0.000		-		0.000	0.000	0.273	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2069 / *F/A-18 Infrared Search and Track (IRST)*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	94.094	0.078		0.000		0.000		-		0.000	0.000	94.172	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2069 / *F/A-18 Infrared Search and Track (IRST)*



2020OSD - 0204136N - 2069

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2069 / *F/A-18 Infrared Search and Track (IRST)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Infra-Red Search and Track				
System Development: Engineering and Manufacturing Development: King Air Integration Lab Block II Phase I	2	2018	3	2018
System Development: Engineering and Manufacturing Development: IRST OFP SW B1	1	2018	1	2018
System Development: Engineering and Manufacturing Development: IRST OFP SW B2	2	2018	4	2018
System Development: Reviews: Physical Configuration Audit (PCA)	1	2018	1	2018
Test and Evaluation: Integration Testing: SCS H14 Integration Testing	1	2018	1	2018
Test and Evaluation: Integration Testing: SCS H16 Integration Testing	1	2018	4	2018
Test and Evaluation: Operational Testing: SCS H14 Integrated Operational Test & Evaluation (IOT&E)	2	2018	4	2018
Test and Evaluation: Operational Testing: SCS H14 OT Assist	2	2018	4	2018
Production Milestones: Block II Prototype Test Assets (RDTE)	1	2018	1	2018
Production Milestones: Block II EDM Test Assets (RDTE)	2	2018	2	2018

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2071 / *F/A-18 Block III*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2071: *F/A-18 Block III*	0.000	57.462	83.146	87.998	-	87.998	30.001	0.000	0.000	0.000	0.000	258.607
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

F/A-18 Block III is a series of several of Engineering Change Proposals (ECPs) that bring planned upgrades to the F/A-18E/F. The combined impact of these upgrades brings significant capability to the aircraft. Block III is a follow-on to Block II upgrades. The FY 2020 budget request funds Non-Recurring Engineering (NRE) for these ECPs which include Advanced Network Architecture, aircraft Signature Enhancements, Advanced Cockpit Displays, and Conformal Fuel Tanks.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: F/A-18 Block III	57.462	83.146	87.998	0.000	87.998
Articles:	-	-	-	-	-

Description: Block III Super Hornet upgrades provide additional capability to the aircraft and its contribution to the Airwing are significant. The capability upgrades consist of several Engineering Change Proposals (ECPs) which will be incorporated in the near term with a combination of forward fit production line incorporation and via retrofit modifications to the aircraft already planned as part of the Service Life Modification (SLM) Plan. The FY 2020 budget request funds Non-Recurring (NRE) for these ECPs.

FY 2019 Plans:

F/A-18 Block III is a series of several of Engineering Change Proposals (ECPs) that bring several planned upgrades to the F/A-18E/F aircraft. The combined impact of these upgrades brings significant capability to the aircraft. The FY19 budget request funds the Non-Recurring (NRE) needed for these ECPs. F/A Block III flight testing will have significant increase in flight testing in FY2019 for advance cockpit, and conformal fuel tank.

FY 2020 Base Plans:

F/A-18 Block III is a series of several of Engineering Change Proposals (ECPs) that bring planned upgrades to the F/A-18E/F aircraft. The combined impact of these upgrades brings significant capability to the aircraft. The FY 2020 budget request funds the Non-Recurring (NRE) needed for these ECPs. F/A Block III flight testing will have significant increase in flight testing in FY 2020 for Conformal Fuel Tank development.

FY 2020 OCO Plans:

N/A

FY 2019 to FY 2020 Increase/Decrease Statement:

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2071 / *F/A-18 Block III*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The FY 2020 funding request was increased by $4.856 million for Block III Conformal Fuel Tank (CFT) flight test support. The initial F/A-18 Block III concept includes low risk changes which can be incorporated in the near term with a combination of forward fit production line incorporation and via retrofit modifications to the aircraft already planned as part of the Service Life Modification (SLM) Plan. The FY19 budget request funded Non-Recurring (NRE) for these ECPs.					
Accomplishments/Planned Programs Subtotals	57.462	83.146	87.998	0.000	87.998

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0525: *F-18 Series*	1,007.030	1,159.675	1,227.089	-	1,227.089	1,293.248	1,502.252	1,936.725	1,898.026	7,770.655	27,479.309
• APN/0145: *FA-18E/F*	1,826.192	1,922.275	1,802.911	-	1,802.911	1,780.868	1,186.989	1,216.228	1,246.678	0.000	55,994.869

Remarks

D. Acquisition Strategy

A series of Block III Engineering Change Proposals (ECPs) will be incorporated into production aircraft starting in FY 2019. The ECPs will provide capability upgrades to Block II aircraft to give them Block III capabilities. Block II Fleet aircraft (Lots 26 and up) will receive capability upgrades when inducted for Service Life Modification (SLM) events.

E. Performance Metrics

The FY 2020 budget request funds the Non-Recurring Engineering (NRE) for the Block III Engineering Change Proposals (ECPs) that will provide upgraded capabilities to the F/A-18 E/F aircraft. Block III capability upgrades is planned to be incorporated into the aircraft on the production line starting with the FY19 procurement. Block II aircraft will receive the Block III ECPs when the aircraft are inducted for Service Life Modification (SLM) events.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2071 / *F/A-18 Block III*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Block III primary development	Various	Boeing : St Louis, MO	0.000	49.077	Dec 2017	70.819	Dec 2018	74.322	Dec 2019	-		74.322	26.313	220.531	220.535
		Subtotal	0.000	49.077		70.819		74.322		-		74.322	26.313	220.531	N/A

Remarks

Increase in funding in FY19 is due to flight testing of Conformal Fuel Tanks (CFTs) and Advanced Cockpit Systems for Block III F/A-18E/F aircraft.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support (AD)	WR	NAWCAD : Pax River, MD	0.000	0.750	Dec 2017	10.088	Dec 2018	11.393	Dec 2019	-		11.393	2.980	25.211	-
Development Support (WD)	WR	NAWCWD : China Lake, CA	0.000	2.736	Dec 2017	2.096	Dec 2018	2.138	Dec 2019	-		2.138	0.565	7.535	-
BLK III Price Fighters	WR	NAVSUP : Philadelphia, PA	0.000	0.079	Dec 2017	0.000		0.000		-		0.000	0.000	0.079	-
		Subtotal	0.000	3.565		12.184		13.531		-		13.531	3.545	32.825	N/A

Remarks

FY 2019 and FY 2020 increase funds Block III CFT flight test support.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation (NASA)	MIPR	NASA : Moffett Field, CA	0.000	4.317	Mar 2018	0.000		0.000		-		0.000	0.000	4.317	-
Test & Evaluation (NASA)	MIPR	NASA : Langley, VA	0.000	0.363	Jun 2018	0.000		0.000		-		0.000	0.000	0.363	-
		Subtotal	0.000	4.680		0.000		0.000		-		0.000	0.000	4.680	N/A

Remarks

Wind Tunnel Testing.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 2071 / *F/A-18 Block III*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Seaport CSS	C/CPFF	Ausley : Pax River, MD	0.000	0.140	Jan 2018	0.143	Dec 2018	0.145	Dec 2019	-		0.145	0.148	0.576	0.576
		Subtotal	0.000	0.140		0.143		0.145		-		0.145	0.148	0.576	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	57.462		83.146		87.998		-		87.998	30.006	258.612	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2071 / *F/A-18 Block III*

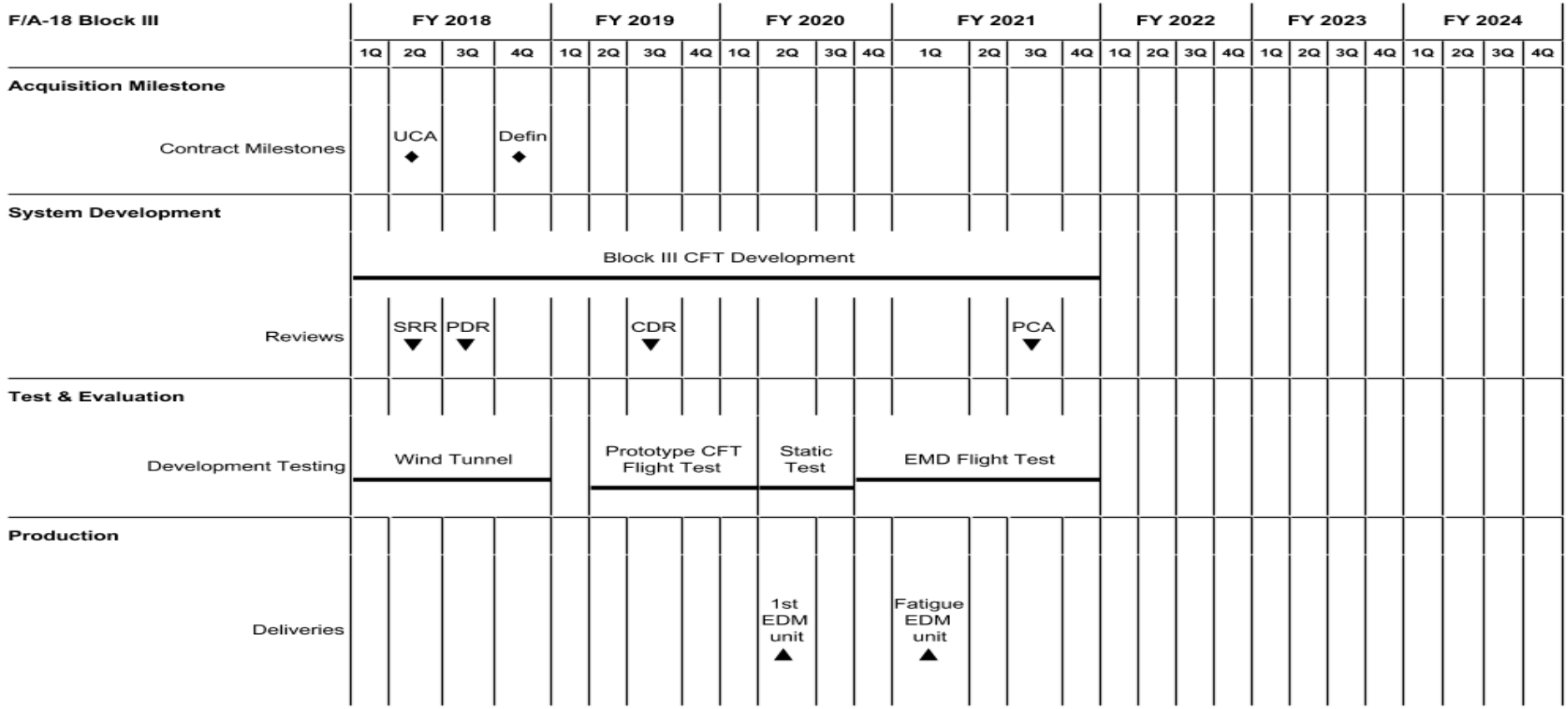


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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 2071 / *F/A-18 Block III*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
F/A-18 Block III				
Acquisition Milestone: Contract Milestones: UCA	2	2018	2	2018
Acquisition Milestone: Contract Milestones: DEFIN	4	2018	4	2018
System Development: Block III CFT Development	1	2018	4	2021
System Development: Reviews: System Requirements Review	2	2018	2	2018
System Development: Reviews: Preliminary Design Review	3	2018	3	2018
System Development: Reviews: Critical Design Review	3	2019	3	2019
System Development: Reviews: Physical Configuration Audit	3	2021	3	2021
Test & Evaluation: Development Testing: Wind Tunnel Testing	1	2018	4	2018
Test & Evaluation: Development Testing: Prototype CFT Flight Test	2	2019	1	2020
Test & Evaluation: Development Testing: Static Test	2	2020	3	2020
Test & Evaluation: Development Testing: EMD Flight Test	4	2020	4	2021
Production: Deliveries: 1st EDM unit	2	2020	2	2020
Production: Deliveries: Fatigue EDM unit	1	2021	1	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	11.800	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.800
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

1) Noise Reduction: Research, Development, Test and Evaluation (RDT&E) funding to support the redesign of Chevron seals to reduce engine exhaust plume noise. Numerous solutions have been evaluated. Chevron seals were determined to be the favorable solution for the F/A-18 and EA-18G. Previous testing of F414 chevrons demonstrated satisfactory noise reduction up to 80% power, but did not satisfy noise reduction requirements at full power. A possible cause of this problem has been identified. There are re-design options available to sustain noise reduction up to full power. Additional development and test will be required to finalize the Chevron design to achieve the desired noise reduction at all power levels. The subject funding will support the initial development efforts.

2) Navy Joint Air-to-Ground Missile for Fixed Wing Aircraft(JAGM-F) - Research, Development, Test and Evaluation (RDT&E) funding to support the initial integration efforts for the next generation of air-to-ground missile onto the F/A18E/F aircraft. The JAGM-F missile test and evaluation efforts are being conducted to ensure missile compatibility with the Navy environment and to confirm the performance of the missile meets mission requirements. The JAGM-F will build on the SDB II Unique Armament Interface integration efforts that are currently underway on the F/A-18E/F.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Noise Reduction ***FY 2018 Accomplishments:*** N/A ***FY 2019 Plans:*** Funding provides for initial platform integration efforts on DoN platforms, including fit checks, ground launch eject testing, F/A-18 wind tunnel testing, F/A-18 strength/loads/Noise Vibe/Flutter analysis, and software integration lab tests of the JAGM-F electrical interface.	0.000	2.000
Congressional Add: Navy Joint Air-to-Ground Missile for Fixed Wing Aircraft ***FY 2018 Accomplishments:*** N/A ***FY 2019 Plans:*** Funding provides design and development efforts to redesign Chevron seals.	0.000	9.800
Congressional Adds Subtotals	0.000	11.800

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 9999 / *Congressional Adds*

D. Acquisition Strategy

1) Noise Reduction: Noise Reduction development and test is require to study the Chevron design to achieve the desired noise reduction at all power levels.

2) Navy Joint Air-to-Ground Missile for Fixed Wing Aircraft(JAGM-F). JAGM-F is being developed for the rotary wing AGM variant, and includes development necessary to be compatible with DoN and USAF fixed wing aircraft. The DoN and USAF integration and test activities will inform the DoN's acquisition approach for JAGM as a potential successor for the DoN's aging MAVERICK program.

E. Performance Metrics

1) Noise Reduction: Redesign of Chevron seals to reduce engine exhaust plume noise

2) Navy Joint Air-to-Ground Missile for Fixed Wing Aircraft(JAGM-F). Pursue initial platform integration efforts on DoN platforms, including fit checks, ground launch eject testing, F/A-18 wind tunnel testing, F/A-18 strength/loads/Noise Vibe/Flutter analysis, software integration lab tests of the JAGM-F electrical interface, and IMV flights.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204136N / *F/A-18 Squadrons*	Project (Number/Name) 9999 / *Congressional Adds*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Noise Reduction	C/CPFF	GE Aviation : Lynn, Massachusetts	0.000	0.000		2.000	Jun 2019	0.000		-		0.000	0.000	2.000	2.000
		Subtotal	0.000	0.000		2.000		0.000		-		0.000	0.000	2.000	N/A

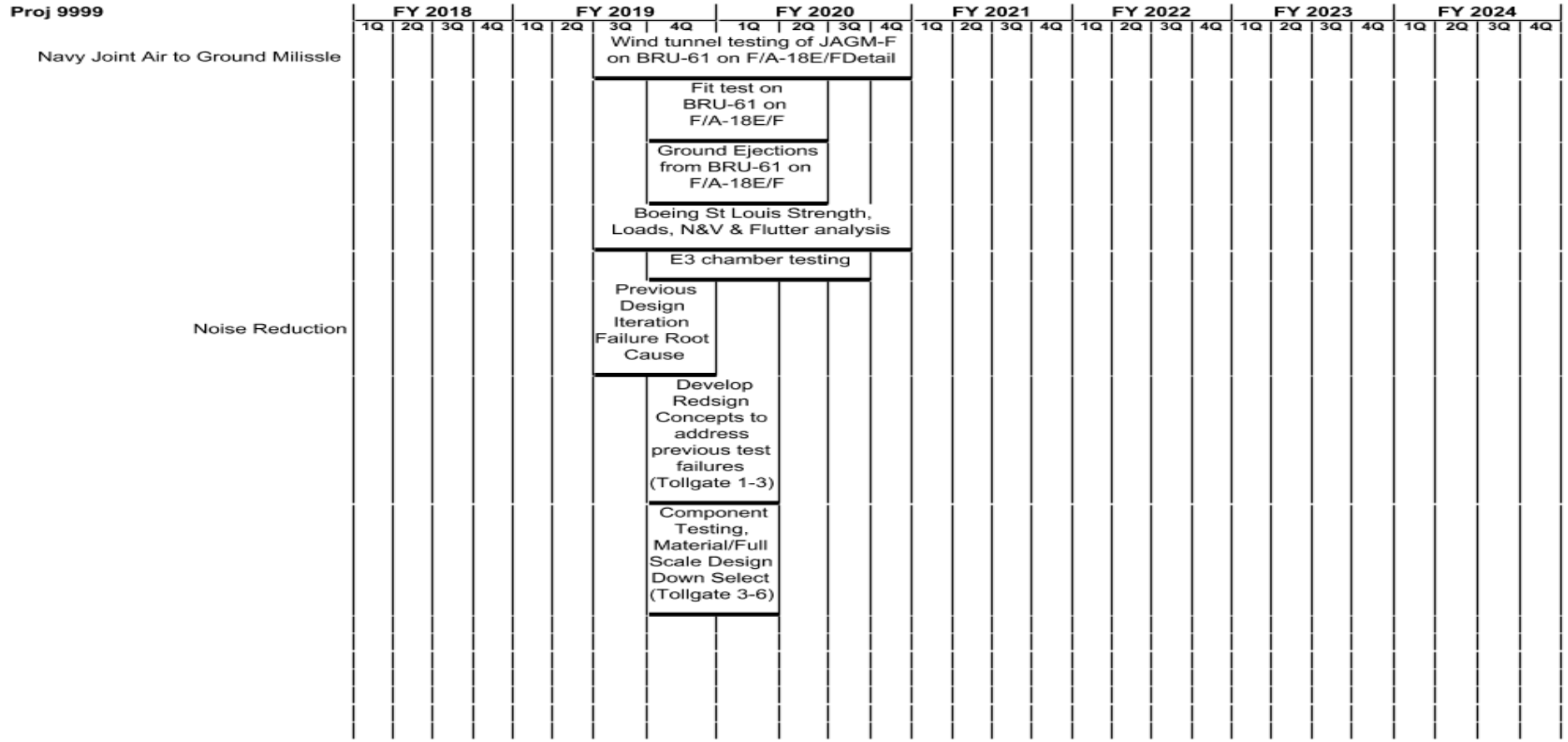
Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Wind tunnel testing of JAGM-F on BRU-61 on F/A-18E/Fxt	WR	NAWC / Boeing : Not Specified	0.000	0.000		6.630	Oct 2019	0.000		-		0.000	0.000	6.630	6.630
Fit test on BRU-61 on F/A-18E/F	WR	NAWC : Not Specified	0.000	0.000		0.010	Jan 2019	0.000		-		0.000	0.000	0.010	0.010
Ground Ejections from BRU-61 on F/A-18E/F	WR	NAWC / Boeing : Not Specified	0.000	0.000		0.160	Jan 2019	0.000		-		0.000	0.000	0.160	0.160
Strength, Loads, N&V & Flutter analysis	PO	Boeing : Not Specified	0.000	0.000		1.500	Oct 2019	0.000		-		0.000	0.000	1.500	1.500
E3 chamber testing	WR	NAWC : Not Specified	0.000	0.000		1.500	Oct 2019	0.000		-		0.000	0.000	1.500	1.500
		Subtotal	0.000	0.000		9.800		0.000		-		0.000	0.000	9.800	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		11.800		0.000		-		0.000	0.000	11.800	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 9999 / *Congressional Adds*



2020PB - 0204136N - 9999

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204136N / *F/A-18 Squadrons*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Navy Joint Air to Ground Milissle: Wind tunnel testing of JAGM-F on BRU-61 on F/A-18E/FDetail	3	2019	4	2020
Navy Joint Air to Ground Milissle: Fit test on BRU-61 on F/A-18E/F	4	2019	2	2020
Navy Joint Air to Ground Milissle: Ground Ejections from BRU-61 on F/A-18E/F	4	2019	2	2020
Navy Joint Air to Ground Milissle: Boeing St Louis Strength, Loads, N&V & Flutter analysis	3	2019	4	2020
Navy Joint Air to Ground Milissle: E3 chamber testing	4	2019	3	2020
Noise Reduction: Previous Design Iteration Failure Root Cause	3	2019	4	2019
Noise Reduction: Develop Redsign Concepts to address previous test failures (Tollgate 1-3)	4	2019	1	2020
Noise Reduction: Component Testing, Material/Full Scale Design Down Select (Tollgate 3-6)	4	2019	1	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204163N *I Fleet Tactical Development*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	239.523	8.465	1.344	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	249.332
0725: *Communication Automation*	239.523	8.465	1.344	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	249.332

Note

Funding for the following projects has been realigned out of PE 0204163N into PE 0604280N and PE 0303138N as part of Program Element Consolidation starting in FY20: Project 0725 Communication Automation

A. Mission Description and Budget Item Justification

The Communication Automation Program is a continuing program that provides for automation and communications upgrades for fleet tactical users. It includes Battle Force Tactical Network (BFTN), Joint Aerial Layer Network-Maritime (JALN-M), and Automated Digital Network System (ADNS).

The Battle Force Tactical Network (BFTN) on each surface, subsurface, air, or fixed US Navy platform utilizes previously installed/existing Line of Sight (LOS)/Extended Line of Sight (ELOS) radios to create a secure gateway that inter-connects all users into a common Radio Frequency (RF) Tactical Network. This network directly supports the Resilient Command and Control (RC2) posture of US-Only and North Atlantic Treaty Organization (NATO) Allied/Coalition users' tactical data information exchanges on each platform between and/or across separately dispersed RF Networks even if Satellite Communications (SATCOM) channels to shore are lost. This system is formally specified by both Fleet Commanders as a threshold capability for global maritime command control and communications in a Distributed Maritime Environment to execute current warfighting plans.

Joint Aerial Layer Network-Maritime (JALN-M), a system of systems (SoS) capability, is the Navy implementation of the JALN-M architecture which provides assured communications in any environment, especially RC2. With disruption or loss of space tier communications, JALN-M establishes and/or restores connectivity with the High Capacity Backbone (HCB) tier, the Distribution Access Range Extension (DARE) tier, and the Transition tier in accordance with the JALN-M Initial Capabilities Document (ICD) and the JALN-M Analysis of Alternatives (AoA) Final Report. JALN-M is a robust, assured communications capability providing joint connectivity via the HCB and Navy platform connectivity via a pseudo satellite DARE capability. The objective is to provide an alternative communication path in a denied environment, to support key information exchange requirement via ADNS. Flight test demonstration completed in FY18.

Automated Digital Network System (ADNS) is the method by which Tactical Navy units transfer Internet Protocol (IP) data to Navy and Department of Defense communities on the Global Information Grid (GIG). ADNS is the gateway to tactical Wide Area Network (WAN) afloat for Internet Protocol network operations, supporting information dissemination and external connectivity. ADNS enables services and applications to interconnect to the Defense Information Systems Network (DISN) ashore via multiple Radio Frequency (RF) resources, to include emerging Assured Command and Control (C2) capabilities and pier connectivity.

Automated Digital Network System (ADNS) will perform technical analyses and engineering efforts associated with implementation of new technology to enable rapid introduction of new products and technology, prevent obsolescence, and end of support issues.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204163N *I Fleet Tactical Development*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	33.525	25.014	23.870	-	23.870
Current President's Budget	8.465	1.344	0.000	-	0.000
Total Adjustments	-25.060	-23.670	-23.870	-	-23.870
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-23.670			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.060	0.000			
• Program Adjustments	0.000	0.000	-1.436	-	-1.436
• Rate/Misc Adjustments	0.000	0.000	-22.434	-	-22.434
• Congressional Directed Reductions Adjustments	-25.000	-	-	-	-

Change Summary Explanation

Beginning in FY20, project 0725 was realigned from Program Element (PE) 0204163N to PE 0604280N (BFTN) and 0303138N (ADNS) due to budget line item consolidation.

FY18: High frequency over-the-horizon robust enterprise (HForce) received a $25.0 million congressional reduction for concurrent efforts.

FY19: HForce received a $23.67 million congressional reduction and was terminated.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204163N / *Fleet Tactical Development*	Project (Number/Name) 0725 / *Communication Automation*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0725: *Communication Automation*	239.523	8.465	1.344	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	249.332
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Funding has been realigned out of PE 0204163N Project 0725, into PE 0604280N (BFTN) and PE 0303138N (ADNS) as part of RDTEN PE Consolidation starting in FY20.

A. Mission Description and Budget Item Justification

The Battle Force Tactical Network (BFTN) on each surface, subsurface, air, or fixed US Navy platform uses previously installed/existing Line of Sight (LOS)/Extended Line of Sight (ELOS) radios (a.k.a. Radio Frequency (RF)) to create a secure gateway that inter-connects all users into a common RF Tactical Network (a.k.a. wireless). BFTN enables war-fighters to digitally communicate National Atlantic Treaty Organization (NATO) Allied/Coalition and US-Only information necessary to execute and plan in a real-time operational environment without relying on ashore application server interaction. This RF Network separately supports US-Only Carrier and Expeditionary Strike Group Commanders and maintains the digital communication ability to execute and plan with other U.S. ships, submarines or aircraft, as well as with NATO Allied/Coalition networks, even if Satellite Communication (SATCOM) channels to shore are lost. This system is formally specified by both Fleet Commanders as a threshold capability for global maritime command control and communications in a Distributed Maritime Environment to execute current warfighting plans.

Joint Aerial Layer Network-Maritime (JALN-M), a system of systems (SoS) capability, is the Navy implementation of the JALN-M architecture which provides assured communications in any environment, especially Resilient Command and Control (RC2). With disruption or loss of space tier communications, JALN-M establishes and/or restores connectivity with the High Capacity Backbone (HCB) tier, the Distribution Access Range Extension (DARE) tier, and the Transition tier in accordance with the JALN-M Initial Capabilities Document (ICD) and the JALN-M Analysis of Alternatives (AoA) Final Report. JALN-M is a robust, assured communications capability providing joint connectivity via the HCB and Navy platform connectivity via a pseudo satellite DARE capability. The objective is to provide an alternative communication path in a denied environment, to support key information exchange requirement via Automated Digital Network Systems (ADNS). Flight test demonstration completed in FY18.

Automated Digital Network System (ADNS) provides routing, switching, baseband, configuration and monitoring capabilities for interconnecting naval, coalition and joint enclaves worldwide. ADNS utilizes off the shelf equipment and network protocols as specified by the Joint Technical Architecture. ADNS INC III combines all Navy Tactical Voice, Secure Communications Interoperability Protocol (SCIP) Inter-Working Function, video, and data requirements into a converged IP data stream. ADNS INC III supports higher bandwidth satellites, providing up to 25 megabytes per second (Mbps) of throughput on Unit Level ships and up to 50 Mbps on Force Level ships. INC III architecture also incorporates an IPv4/IPv6 dual stack and Cipher-Text (CT) security architecture to align to the Global Information Grid (GIG) in order to mesh Navy Tactical surface, subsurface, airborne platforms, and Aegis Ashore sites into single IP environments with gateway functions to coalition and joint networks, in addition to greater security utilizing the High Assurance Internet Protocol Encryptor (HAIPE) devices. ADNS will serve as the Navy tactical interface for IP Networking for

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204163N / *Fleet Tactical Development*	**Project (Number/Name)** 0725 / *Communication Automation*

not only the JALN-M system but also the key Assured Command and Control (C2) capabilities. ADNS will investigate emerging technologies to integrate with additional Department of Defense C4I Programs to improve inter-strike group networking and extend the network to the tactical edge.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Battle Force Tactical Network (BFTN)	0.499	0.500	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Overall program efforts include investigation of emerging technologies through study, development and associated testing for feasibility of program insertion. BFTN is the Navy's program of record for high-frequency internet protocol (HFIP) and Ultra High Frequency (UHF) Line of Sight (LOS) subnet relay (SNR) communications. BFTN is the only Allied/Coalition option, providing command and control in a non-satellite communications (SATCOM) or SATCOM-denied environment and serves as a primary backup for SIPRNET (Secret Internet Protocol Router Network) in the absence of SATCOM. ***FY 2019 Plans:*** Continue to correct deficiencies identified during Initial Operational Test & Evaluation (IOT&E), conduct Follow-On Test & Evaluation (FOT&E), and obtain Full Rate Production (FRP) decision. Continue to develop engineering solutions for end of life issues, obsolescence, and increase system ease of use for operators. ***FY 2020 Base Plans:*** FY20 funding has been realigned to PE 0604280N Project 0725 as part of PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0604280N Project 0725.					
Title: Joint Aerial Layer Network -Maritime (JALN-M)	7.038	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Current threats being pursued by US adversaries include the ability to deny US Forces satellite communications. In the absence of satellite communications, JALN-M is a system that can provide high capacity anti-jam communications to naval forces by utilizing aerial relays. The FY18 demonstration will complete the proof-of-concept. ***FY 2019 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204163N / *Fleet Tactical Development*	**Project (Number/Name)** 0725 / *Communication Automation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No funding in FY20.					
Title: Automated Digital Network System (ADNS)	0.928	0.844	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: Continue testing and interfacing with ENMS, IPv6 transition, and integration of SHF. Continue the IDD and integration with network applications, develop LOS link, DISN integration and development of CT piers. Investigate and recommend platform network devices, network design support to include procurement, integration and testing of the WAN. Continue network-based Cyber Security technology and virtualization of ADNS. ***FY 2020 Base Plans:*** FY20 funding has been realigned to PE 0303138N Project 0725 as part of PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0303138N Project 0725.					
Accomplishments/Planned Programs Subtotals	8.465	1.344	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3057: *Battle Force Tactical Network (BFTN)*	16.280	39.081	35.156	-	35.156	40.460	42.458	31.586	32.168	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204163N / *Fleet Tactical Development*	**Project (Number/Name)** 0725 / *Communication Automation*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3050: *Automated Digital Network System (ADNS)*	99.545	105.087	137.861	-	137.861	122.421	94.494	96.577	92.889	Continuing	Continuing
• RDTEN/0604280N/0725: *Battle Force Tactical Network (BFTN)*	0.000	0.000	3.114	-	3.114	0.505	0.562	0.620	0.652	Continuing	Continuing

Remarks

D. Acquisition Strategy

Battle Force Tactical Network (BFTN) - Completion of Full Rate Production (FRP) decision enabling the program to move forward with fielding additional systems.

Joint Aerial Layer Network-Maritime (JALN-M) will address capability gaps as directed by the JALN-M Analysis of Alternatives (AoA) by integrating a suite of technical capabilities into a single payload. Technical and acquisition support will be provided to conduct High Capacity Backbone (HCB) and Airborne Extended Data Rate (XDR) demonstrations and to develop two prototype JALN-M payloads.

Automated Digital Network System (ADNS): Evolutionary acquisition approach with overlapping development and implementation phases for defined INC I, II, and III baselines. INC I, II, and III will use competitively awarded contracts to implement changes consistent with acquisition initiatives. ADNS leverages Commercial-Off-The-Shelf (COTS) and Government Off-the-Shelf (GOTS) products while capitalizing on acquisition reform initiatives to achieve material savings in the logistics, installation, integration and training areas. Where feasible, differing types of advantageous contract vehicles will be used to provide flexibility, decrease contract administrative costs, and encourage acquisition streamlining through the use of COTS/GOTS products.

E. Performance Metrics

BFTN - Complete Follow-on Test and Evaluation (FOT&E) event to demonstrate a 3 node high frequency network connection. This event will evaluate the capability of BFTN against its intended threats in threat-representative environments. Performance will be evaluated against defined and derived performance criteria.

ADNS - Included in the ADNS program goals are the improvements to bandwidth throughput, connectivity to multiple Radio Frequency (RF) paths, greater security, and system capability delivered within a smaller form factor. The ADNS program will, at a minimum, provide bandwidth throughput enhancements resulting in an increase from 2 megabytes per
second (Mbps) to 25/50 Mbps. ADNS will also provide the ability to transport data across multiple paths simultaneously vice the current limitations of single or secondary paths. ADNS will provide greater security posture by encrypting each enclave, increasing performance of the routing and transport architecture while reducing physical footprint and cost, and securing the core via Cipher-Text.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204163N / *Fleet Tactical Development*	**Project (Number/Name)** 0725 / *Communication Automation*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	Various	Various : Various	62.126	0.000		0.000		0.000		-		0.000	0.000	62.126	-
Systems Engineering-ADNS	WR	SSC : PAC/LANT	25.280	0.557	Dec 2017	0.510	Dec 2018	0.000		-		0.000	0.000	26.347	-
Systems Engineering-ADNS	WR	NUWC : Newport, RI	3.647	0.184	Dec 2017	0.166	Dec 2018	0.000		-		0.000	0.000	3.997	-
System Engineering-ADNS	C/CPFF	NUWC : Newport, RI	0.255	0.046	Mar 2018	0.041	Mar 2019	0.000		-		0.000	0.000	0.342	-
Integration and Test-ADNS	C/CPFF	SSC : PAC	0.132	0.046	Mar 2018	0.041	Mar 2019	0.000		-		0.000	0.000	0.219	-
Primary Hardware/ Software - HForce	C/FFP	MIT/Lincoln Lab : Lexington MA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Primary Hardware/ Software - HForce TRANSEC	C/FFP	MIT/Lincoln Lab : Lexington MA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
System Engineering JALN-M	MIPR	GTRI : Atlanta, GA	0.000	1.500	Mar 2018	0.000		0.000		-		0.000	0.000	1.500	-
Certification Authorization - HForce	WR	NSA : Ft. Meade, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Primary Hardware/ Software - JALN-M	C/FFP	MIT/Lincoln Lab : Lexington MA	75.333	1.796	Feb 2018	0.000		0.000		-		0.000	0.000	77.129	-
System Engineering JALN-M	C/CPFF	STF : San Diego,CA	4.394	0.800	Feb 2018	0.000		0.000		-		0.000	0.000	5.194	-
System Enginering JALN-M	WR	SSC : PAC	3.838	1.792	Nov 2017	0.000		0.000		-		0.000	0.000	5.630	-
		Subtotal	175.005	6.721		0.758		0.000		-		0.000	0.000	182.484	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support	Various	Various : Various	11.701	0.000		0.000		0.000		-		0.000	0.000	11.701	-
System Engineering BFTN	WR	SSC : LANT	0.892	0.000		0.250	Dec 2018	0.000		-		0.000	0.000	1.142	-
System Engineering BFTN	C/CPFF	STF : San Diego, CA	0.948	0.000		0.000		0.000		-		0.000	0.000	0.948	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204163N / *Fleet Tactical Development*	Project (Number/Name) 0725 / *Communication Automation*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel - JALN-M	WR	PMW 170 : San Diego, CA	0.000	0.050	Jan 2018	0.000		0.000		-		0.000	0.000	0.050	-
Studies and Analysis BFTN	WR	SSC : PAC	0.604	0.000		0.000		0.000		-		0.000	0.000	0.604	-
Development Support - HForce	WR	SSC : San Diego,CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
System Engineering BFTN	WR	SSC : PAC	1.312	0.000		0.250	Dec 2018	0.000		-		0.000	0.000	1.562	-
Logistics Support BFTN	C/CPFF	CSA : San Diego, CA	0.799	0.000		0.000		0.000		-		0.000	0.000	0.799	-
Development Support - JALN-M	C/CPFF	BAH : San Diego	4.787	0.850	Dec 2017	0.000		0.000		-		0.000	0.000	5.637	-
Development Support - JALN-M	WR	SSC : PAC	4.004	0.000		0.000		0.000		-		0.000	0.000	4.004	-
Financial Management Support - JALN-M	C/CPFF	Artemis : San Diego, CA	1.133	0.000		0.000		0.000		-		0.000	0.000	1.133	-
Certification Authority-ADNS	C/CPFF	BAH : San Diego,CA	0.232	0.095	Jan 2018	0.086	Jan 2019	0.000		-		0.000	0.000	0.413	-
		Subtotal	26.412	0.995		0.586		0.000		-		0.000	0.000	27.993	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	Various	Various : Various	22.977	0.000		0.000		0.000		-		0.000	0.000	22.977	-
Integration and Test BFTN	C/FFP	COMOPTEVOR : Norfolk, VA	2.219	0.050	Mar 2018	0.000		0.000		-		0.000	0.000	2.269	-
Test and Evaluation Support BFTN	WR	SSC : PAC	9.101	0.449	Dec 2017	0.000		0.000		-		0.000	0.000	9.550	-
		Subtotal	34.297	0.499		0.000		0.000		-		0.000	0.000	34.796	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204163N / *Fleet Tactical Development*	Project (Number/Name) 0725 / *Communication Automation*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support - HForce	C/CPFF	BAH : San Diego, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Program Management Support - JALN-M	C/CPFF	BAH : San Diego, CA	0.000	0.250	Jan 2018	0.000		0.000		-		0.000	0.000	0.250	-
Program Management Support - BFTN	C/CPFF	BAH : San Diego, CA	2.822	0.000		0.000		0.000		-		0.000	0.000	2.822	-
Program Management Support JALN-M	C/CPFF	BAH : San Diego, CA	0.987	0.000		0.000		0.000		-		0.000	0.000	0.987	-
		Subtotal	3.809	0.250		0.000		0.000		-		0.000	0.000	4.059	N/A

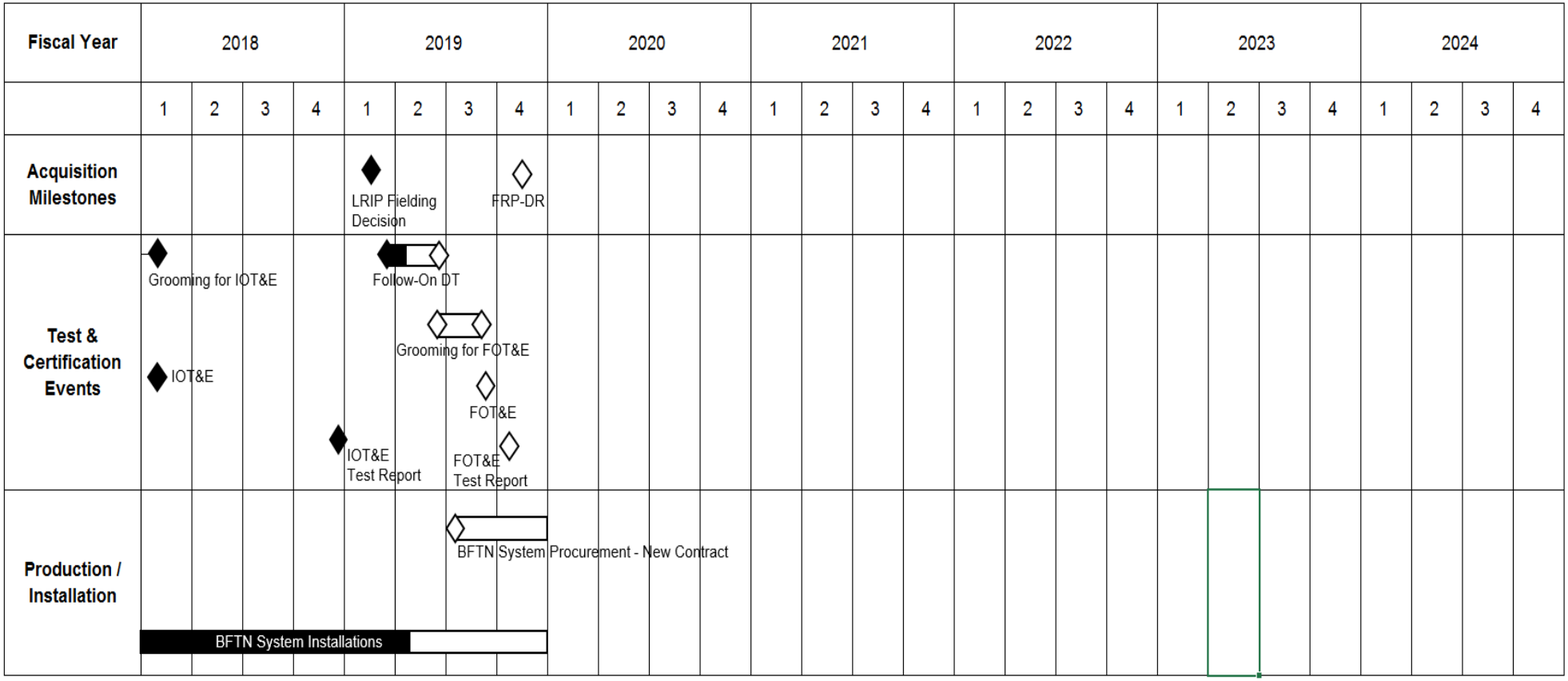
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	239.523	8.465		1.344		0.000		-		0.000	0.000	249.332	N/A

Remarks

FY20 cost data is provided under PE 0604280N Project 0725 and PE 0303138N Project 0725.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204163N / *Fleet Tactical Development*	**Project (Number/Name)** 0725 / *Communication Automation*

BFTN



- Original FRP-DR has been updated to reflect LRIP Fielding Decision with FRP-DR in August FY 2019.
- Efforts in FY20 and out are funded under PE 0604280N Project 0725 (new PE/Project).

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204163N / *Fleet Tactical Development*	**Project (Number/Name)** 0725 / *Communication Automation*

JALN-M Demonstration

Fiscal Year	2018				2019				2020				2021				2022				2023				2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Pod	Flight Testing			Test Report*																								
Airborne XDR (AXDR) Waveform	Subsystem Integration & Test																											
HCB	Subsystem Integration & Test																											
MGEP	Integration & Installation																											

Note: Test Report is funded with FY 2018 RDT&E

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204163N / *Fleet Tactical Development*	**Project (Number/Name)** 0725 / *Communication Automation*

EXHIBIT R-4, RDT&E Schedule Profile: PB 2020 — **DATE:** December 2018

Appropriation/Budget Activity	R-1 Program Element	PROJECT NUMBER AND NAME
1319 / 07	PE 0204163N	0725 - Communication Automation - ADNS

ADNS

Fiscal Year	2018				2019				2020				2021				2022				2023				2024			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Acquisition Milestones							INC III ILA-S/ PSR		FY20 to FY24 funding has been realigned to PE 0303138N Project 0725 as part of PE Consolidation																			
System Development	Interface Design Development & Integration with Future SATCOM and Radio Frequency (RF) paths																											
	Interface Design Development & Integration with Network Applications and DISN																											
Test & Evaluation Milestones																												
Operational Assessment (OA)																												
Development Test																												
Operational Test																												
Production	Fielding & Sustainment INC III Surface																											
	Fielding & Sustainment INC III Subs																											
Deliveries																												

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204163N / *Fleet Tactical Development*	**Project (Number/Name)** 0725 / *Communication Automation*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
BFTN				
Grooming for Initial Operational Test & Evaluation	1	2018	1	2018
Initial Operational Test & Evaluation	1	2018	1	2018
IOT&E Test Report	4	2018	4	2018
Low Rate Initial Production (LRIP) Fielding Decision	1	2019	1	2019
Follow-On Developmental Test (DT)	1	2019	2	2019
Grooming for Follow-On Test & Evaluation (FOT&E)	2	2019	3	2019
FOT&E	3	2019	3	2019
FOT&E Test Report	4	2019	4	2019
FRP-DR	4	2019	4	2019
JALN-M				
Pod Flight Testing	1	2018	3	2018
Pod Test Report	4	2018	2	2019
ADNS				
System Development: ADNS: Increment III_Interface Design Development and Integration with Network Applications and Defense Information Systems Network (DISN)	1	2018	4	2024
System Development: ADNS: Increment III_Interface Design Development and Integration with SATCOM and Radio Frequency (RF) paths	1	2018	4	2024
Production: ADNS: Increment III_Fielding and Sustainment INC III Surface	1	2018	4	2024
Production: ADNS: Increment III_Fielding and Sustainment INC III Submarines	1	2018	4	2024
Acquisition Milestones: ADNS: Increment III Product Support Review	3	2019	3	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204228N *I Surface Support*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	60.416	20.587	9.708	36.389	-	36.389	33.116	19.896	15.166	15.470	Continuing	Continuing
3311: *Navigation Systems*	60.416	20.587	9.708	36.389	-	36.389	33.116	19.896	15.166	15.470	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Surface Support RDT&E funding will be used for the research, design, development, integration testing, and documentation of a new Inertial Navigation System (INS) AN/WSN-12 for all Navy platforms. The INS provides mission critical ship's position and attitude data to shipboard sensors (such as radars), combat systems, gun, and missile systems. The INS uses data from the Global Positioning System (GPS) to periodically update (i.e., reset) its position and internal clock. The INS is the ship's primary position source in the absence of GPS. The INS AN/WSN-12 consists of an Inertial Sensor Module (ISM) and a Navigation Processing Module (NPM) that will provide a significant improvement with respect to attitude and velocity data over previous INS through the use of Power Spectral Density (PSD) capability. PSD provides a tighter tolerance for error across a wider frequency range. The ISM is being designed, developed, and procured through a competitive contract awarded to Northrop Grumman in November 2015. The NPM is a Government design. The government will serve as integration agent prior to the next AN/WSN-12 competitive award scheduled for January 2022. RDT&E funding will support continued system design to create a baseline for Pre-Production Units (PPU), Low Rate Initial Production (LRIP), and Full Rate Production (FRP). The system will go through Critical Design Review (CDR), Test Readiness Review (TRR), and Production Readiness Reviews (PRR). The system will go through extensive testing including Independent Validation and Verification (IV&V), Developmental Testing (DT) and Operational Testing (OT). Planned FY 2020 efforts include conduct of Physical Configuration Audit (PCA) and completion of logistics documentation.

Cybersecurity funding will be used for the research, development, documentation and integration testing for cybersecurity hardening and enclave development for navigation systems. Efforts will include the development of boundary defense capabilities, platform specific architectures, Navy-Electronic Chart Display and Information System (Navy-ECDIS) secure solution for existing unclassified configurations and CYBERSAFE implementation and conduct of cybersecurity risk and vulnerability assessments including development of system models, threat models, and mission models for representative groupings of Navigation systems and cybersecurity capabilities. Risk assessments along with requirements development will lead to incremental capability development leveraging the Increment 1 Engineering Development Model (EDM) delivery with updated architectures and system level modifications. Follow on capabilities will be developed and added to meet existing threats and requirements. Planned FY 2020 efforts include Cross Domain Solution (CDS) and cyber capability Increment 2 development.

Time and Frequency Distribution System-Replacement (TFDS-R) funding will be used for the research, development, documentation, and integration testing for the Submarine TFDS-R system. TFDS is a Commercial Off the Shelf (COTS) timing system utilizing the precision source signals of GPS to discipline two redundant Rubidium clocks to Universal Coordinated Time (UTC). TFDS provides common time to submarine equipment that utilizes clocking pulses or sinusoidal waveforms for proper operation and maintains accurate time in the event of loss of GPS input (holdover). TFDS Uses multiple input power sources for redundancy and provides a built in battery backup. TFDS generates and distributes Precision Time and Timing Interval (PTTI) reference signals to support C4I capabilities needed for Joint, Naval and Allied missions. This funding will be used to conduct a system level Analysis of Alternatives (AoA) and develop a Technical Requirements Document (TRD). These documents will support detailed analysis of the program implementation strategy to replace obsolete TFDS systems in the fleet including appropriate documentation and contracting strategies. Planned FY 2020 efforts include development of an Engineering Development Model (EDM).

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204228N *I Surface Support*

Military GPS User Equipment (MGUE) will provide assured Positioning, Navigation and Timing (PNT) in a GPS degraded environment. Funding will be used for development of interface and performance requirements, shipboard system architecture definition, and MGUE integration into SSNs, Tomahawk, and Advanced Anti-Radiation Guided Missile (AARGM). Planned FY 2020 efforts include early integration with combat/weapons control and other critical systems.

Submarine Speed Sensors will provide investigation, development, testing, and integration of new Own-Ship Speed sensors to address new capabilities, reduce detection, and improve reliability. Planned FY 2020 efforts include Environmental Qualification Testing of Doppler sensor.

As part of the Future Navy Capability initiative, Assured Positioning, Navigation, and Timing (APNT) funding will be used for Alternate GPS-independent sources of Positioning, Velocity, Attitude, and Timing (PVAT) data required to provide fire control solutions, ensure safety of navigation, and support aircraft and combat operations in a GPS degraded/denied environment. This effort provides a secure navigation method using the Cooperative Engagement Capability (CEC) network and corresponding time and navigation resources being developed via ONR Future Naval Capabilities (FNC) activity. CEC is a critical component of Naval Integrated Fire Control (NIFC) efforts and Integrated Air and Missile Defense (IAMD). Fleet Priority: CEC Non-GPS Aided Positioning for Surface and Submarine (NoGAPSS) addresses 15 Integrated Priorities Capability List (IPCL) Gaps (IAMD 1,4,5,6,7,8,9,10; SUW 1,3,4,6; EW 3; ASW 1,2).

As part of the Future Navy Capability initiative, Automated Celestial Navigation System (ACNS) funding will be used for the research, development, Engineering Development Model (EDM), documentation and integration testing of the celestial navigation solution for the No Gaps navigation implementation on the fleet. Efforts will leverage ONR celestial navigation research into a reproducible ruggedized system fully integrated into the navigation suite. FY 2020 efforts include release of development contract.

As part of the Future Navy Capability initiative, Navigation Suite funding will be used to conduct analyses and studies on impact of the PVAT Navy Integrating Capability Construct (NICC) to validate, verify and test latency requirements to combat systems consumers. Efforts will include analysis and planning for the alignment and evolution of Afloat Navigation Systems for surface and submarine platforms and development of Capability Phasing Planning (CPP) processes to drive engineering analysis. The program will implement systems engineering processes to investigate major navigation system error sources, define new functions, research new technologies, algorithms, and techniques to improve system performance, conduct analyses of alternatives, create preliminary and final design concepts, develop new hardware components and associated software, and conduct land based and shipboard testing. Funding will also be used to research and integrate electronic charts into mission planning tools and other combat system elements to provide improved fidelity and commonality among elements and improve navigation awareness in compliance with Navy NAVWAR policies including integration of a Secondary Control Display Unit (SCDU) for the bridge on Surface Platforms. Additional research and integration testing will be conducted for a horizontal plotter display for Navy ECDIS to replace existing chart tables and other navigation oriented tables shipboard.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy* / BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0204228N / *Surface Support*			
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	24.829	11.661	23.589	-	23.589
Current President's Budget	20.587	9.708	36.389	-	36.389
Total Adjustments	-4.242	-1.953	12.800	-	12.800
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.953			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.000	0.000			
• SBIR/STTR Transfer	-0.496	0.000			
• Program Adjustments	0.000	0.000	12.800	-	12.800
• Rate/Misc Adjustments	0.001	0.000	0.000	-	0.000
• Congressional Directed Reductions Adjustments	-2.747	-	-	-	-

Change Summary Explanation

The FY 2020 increase supports the Future Navy Capability initiative for Assured Positioning, Navigation, and Timing (APNT), Automated Celestial Navigation System (ACNS), and associated Navigation Suite.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204228N / *Surface Support*	Project (Number/Name) 3311 / *Navigation Systems*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3311: *Navigation Systems*	60.416	20.587	9.708	36.389	-	36.389	33.116	19.896	15.166	15.470	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Surface Support RDT&E funding will be used for the research, design, development, integration testing, and documentation of a new Inertial Navigation System (INS) AN/WSN-12 for all Navy platforms. The INS provides mission critical ship's position and attitude data to shipboard sensors (such as radars), combat systems, gun, and missile systems. The INS uses data from the Global Positioning System (GPS) to periodically update (i.e., reset) its position and internal clock. The INS is the ship's primary position source in the absence of GPS. The INS AN/WSN-12 consists of an Inertial Sensor Module (ISM) and a Navigation Processing Module (NPM) that will provide a significant improvement with respect to attitude and velocity data over previous INS through the use of Power Spectral Density (PSD) capability. PSD provides a tighter tolerance for error across a wider frequency range. The ISM is being designed, developed, and procured through a competitive contract awarded to Northrop Grumman in November 2015. The NPM is a Government design. The government will serve as integration agent prior to the next AN/WSN-12 competitive award scheduled for January 2022. RDT&E funding will support continued system design to create a baseline for Pre-Production Units (PPU), Low Rate Initial Production (LRIP), and Full Rate Production (FRP). The system will go through Critical Design Review (CDR), Test Readiness Review (TRR), and Production Readiness Reviews (PRR). The system will go through extensive testing including Independent Validation and Verification (IV&V), Developmental Testing (DT) and Operational Testing (OT). Planned FY 2020 efforts include conduct of Physical Configuration Audit (PCA) and completion of logistics documentation.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

Military GPS User Equipment (MGUE) will provide assured Positioning, Navigation and Timing (PNT) in a GPS degraded environment. Funding will be used for development of interface and performance requirements, shipboard system architecture definition, and MGUE integration into SSNs, Tomahawk, and Advanced Anti-Radiation Guided Missile (AARGM). Planned FY 2020 efforts include early integration with combat/weapons control and other critical systems.

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As part of the Future Navy Capability initiative, Assured Positioning, Navigation, and Timing (APNT) funding will be used for Alternate GPS-independent sources of Positioning, Velocity, Attitude, and Timing (PVAT) data required to provide fire control solutions, ensure safety of navigation, and support aircraft and combat operations in a GPS degraded/denied environment. This effort provides a secure navigation method using the Cooperative Engagement Capability (CEC) network and corresponding time and navigation resources being developed via ONR Future Naval Capabilities (FNC) activity. CEC is a critical component of Naval Integrated Fire Control (NIFC) efforts and Integrated Air and Missile Defense (IAMD). Fleet Priority: CEC Non-GPS Aided Positioning for Surface and Submarine (NoGAPSS) addresses 15 Integrated Priorities Capability List (IPCL) Gaps (IAMD 1,4,5,6,7,8,9,10; SUW 1,3,4,6; EW 3; ASW 1,2).

As part of the Future Navy Capability initiative, Automated Celestial Navigation System (ACNS) funding will be used for the research, development, Engineering Development Model (EDM), documentation and integration testing of the celestial navigation solution for the No Gaps navigation implementation on the fleet. Efforts will leverage ONR celestial navigation research into a reproducible ruggedized system fully integrated into the navigation suite. FY 2020 efforts include release of development contract.

As part of the Future Navy Capability initiative, Navigation Suite funding will be used to conduct analyses and studies on impact of the PVAT Navy Integrating Capability Construct (NICC) to validate, verify and test latency requirements to combat systems consumers. Efforts will include analysis and planning for the alignment and evolution of Afloat Navigation Systems for surface and submarine platforms and development of Capability Phasing Planning (CPP) processes to drive engineering analysis. The program will implement systems engineering processes to investigate major navigation system error sources, define new functions, research new technologies, algorithms, and techniques to improve system performance, conduct analyses of alternatives, create preliminary and final design concepts, develop new hardware components and associated software, and conduct land based and shipboard testing. Funding will also be used to research and integrate electronic charts into mission planning tools and other combat system elements to provide improved fidelity and commonality among elements and improve navigation awareness in compliance with Navy NAVWAR policies including integration of a Secondary Control Display Unit (SCDU) for the bridge on Surface Platforms. Additional research and integration testing will be conducted for a horizontal plotter display for Navy ECDIS to replace existing chart tables and other navigation oriented tables shipboard.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: AN/WSN-12 Inertial Navigation System - Replacement (INS-R)	10.824	7.648	7.800	0.000	7.800
Articles:	-	-	-	-	-
FY 2019 Plans: Begin NPM PPU EQT testing Begin ISM PPU EQT testing					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete ISM PPU builds Complete NPM PPU builds Begin PPU integration and interface testing Begin system level PPU land based performance testing ***FY 2020 Base Plans:*** Complete EQT testing Complete integration and interface testing Procure LRIP units Begin OT with land based test sites for combat system integration ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase within inflation (2%).					
Title: Cybersecurity	2.057	0.500	5.016	0.000	5.016
Articles:	-	-	-	-	-
FY 2019 Plans: Complete BDC Requirements development Continue BDC Increment 1 capability development Continue development of Cross Domain Solution (CDS) ***FY 2020 Base Plans:*** Complete BDC Increment 1 capability Continue CDS development Develop CVN architecture Begin Integrated Positioning Navigation, and Timing (iPNT) development Conduct surface integration Begin development of Increment 2 capabilities of boundary defense Field cyber pilot ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The FY 20 increase supports the Future Navy Capability Initiative which includes the development and redesign of Navigation Cyber Enclave architectures; development of cross domain solutions with interfacing systems; begin Integrated Positioning Navigation, and Timing (iPNT) development; and development of statutory Military GPS User Equipment integration.					
Title: Time Frequency Distribution System (TFDS) Replacement	2.000	0.200	1.900	0.000	1.900
Articles:	-	-	-	-	-
FY 2019 Plans: Refine/update RFI					
FY 2020 Base Plans: Release RFI Develop Engineering Development Model (EDM) Conduct land based system level testing					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The increase in FY 20 is commensurate with increased effort planned to advance analysis, development, test and validation of capabilities to replace the increasingly unsupportable Submarine Time Frequency Distribution System (TFDS).					
Title: Military GPS User Equipment (MGUE)	3.906	0.680	6.790	0.000	6.790
Articles:	-	-	-	-	-
FY 2019 Plans: Support integration testing with antenna upgrade Begin integration plan for MGUE into the ECDU					
FY 2020 Base Plans: Begin MGUE card integration into ECDU Complete platform level integration studies for munitions and GPS end users Begin TI-22 EDM integration testing with combat system users					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase to support surface integration and testing beginning in FY 2020.					
Title: Submarine Speed Sensors (SSS) ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Complete flow tank testing and prepare for at-sea testing Conduct Environmental Qualification Testing of Doppler prototype ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase in FY 20 is commensurate with increased effort planned to advance analysis, development, test and validation of the Submarine Speed Sensor (SSS), to include Environmental Qualification Testing (EQT) and simulated operating environment testing of the SSS prototype.	0.800 -	0.000 -	1.200 -	0.000 -	1.200 -
Title: Assured Positioning, Navigation, and Timing (APNT) ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Conduct ACNS/GPNTS/WSN Focused Demos ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** New initiative in FY 2020	0.000 -	0.000 -	3.600 -	0.000 -	3.600 -
Title: Automated Celestial Navigation System (ACNS) ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:***	0.000 -	0.000 -	3.200 -	0.000 -	3.200 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Finalize System Requirements Document Finalize external interface description/controls Receive ONR Technical Data Award ACNS Development Contract ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** New initiative in FY 2020					
Title: Navigation Suite	0.000	0.000	4.700	0.000	4.700
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** Conduct studies and analyses on platform integration improvements Conduct integration of chart services for use by Combat Systems, mission planning tools and other shipboard systems Develop and plan for integrated navigation Land Based Test Site (LBTS) Develop future integrated PVAT suite architecture Develop navigational awareness improvements including integration of a Secondary Control Display Unit (SCDU) Develop horizontal plotter display capability for ECDIS Improve navigation situational awareness including collision avoidance technology measures and surface track commonality Research capability to correlate AIS and radars for a common surface contact picture Collaborate with external organizations like DARPA and DIUX to research availability of automated collision avoidance systems ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
New initiative in FY 2020					
Title: Navigation Support	1.000	0.680	2.183	0.000	2.183
Articles:	-	-	-	-	-
FY 2019 Plans: Provide engineering, logistics, and programmatic support for, AN/WSN-12, Cybersecurity, TFDS, MGUE, SSS, ACNS, APNT, and Navigation Suite.					
FY 2020 Base Plans: Provide engineering, logistics, and programmatic support for, AN/WSN-12, Cybersecurity, TFDS, MGUE, SSS, ACNS, APNT, and Navigation Suite.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The Navigation Support amount is directly based on the total amount of the other RDTE efforts. For FY 2019, the support efforts identified are being conducted, but at a minimal level. For FY 2020, increased support will be expected in the identified areas due to the new Future Navy Capability efforts and full funding of the other RDTE efforts.					
Accomplishments/Planned Programs Subtotals	20.587	9.708	36.389	0.000	36.389

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/0670: *Other Navigation*	62.427	60.830	77.404	-	77.404	73.153	74.297	75.709	66.846	Continuing	Continuing

Remarks

D. Acquisition Strategy

AN/WSN-12 Inertial Sensor Module (ISM) CPIF/CPFF/FFP contract competitively awarded in FY 2016. Contract includes options for conducting R&D milestones, manufacture of Engineering Development Models (EDM) and Pre-Production Units (PPU), and manufacture of Low Rate Initial Production (LRIP) and Full Rate Production (FRP). Planned FY 2020 efforts include start of competitive acquisition of AN/WSN-12 with delivery of Technical Data Package.

E. Performance Metrics

FY 2018

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

Conduct AN/WSN-12 Critical Design Review (CDR)
Develop Cybersecurity Prototype Increment 1 design and ECDIS controlled interface completed design
Execute TFDS Program of Record activities
Complete GPS MGUE Trade Studies
Develop new Doppler prototype

FY 2019
Complete ISM PPU builds and deliver
Complete NPM PPU builds and deliver
Start AN/WSN-12 system level PPU land based performance testing
Start AN/WSN-12 ILS planning
Complete cyber prototype Increment 1
Receive M-Code receiver and begin early integration with HAE2 Level Card

FY 2020
Complete AN/WSN-12 DT
Complete AN/WSN-12 PCA/FCA
Procure AN/WSN-12 LRIP units
Start AN/WSN-12 combat system integration planning
Complete cyber requirements studies
Complete cyber chart services studies
Complete cyber plan for land based test site
Complete CVN cyber architecture
Complete SCDU prototype
Complete integration testing for horizontal plotter
Complete requirements analysis and study for surface correlation capability
Complete requirements development and integration plan for collision avoidance capability
Develop TFDS EDM
Award ACNS Development Contract
Conduct ACNS/GPNTS/WSN Focused Demos

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204228N / *Surface Support*	Project (Number/Name) 3311 / *Navigation Systems*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering/ Design	WR	SPAWAR Atlantic : Little Creek, VA	6.050	1.980	Jan 2018	1.762	Jan 2019	8.840	Dec 2019	-		8.840	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	SPAWAR Pacific : San Diego, CA	0.660	0.615	Jan 2018	0.000		0.600	Dec 2019	-		0.600	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	WR Systems : Norfolk, VA	9.476	5.151	Jan 2018	1.350	Jan 2019	3.650	Mar 2020	-		3.650	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Penn State/ARL : Warminster, PA	3.475	0.693	Aug 2018	0.000		0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC Dahlgren : Dahlgren, VA	0.643	0.000		0.000		2.000	Dec 2019	-		2.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC Dam Neck : Dam Neck, VA	0.340	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC PHD : Port Hueneme, CA	0.122	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NUWC Newport : Newport, RI	0.180	0.000		0.000		0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Old Dominion University : Suffolk, VA	0.450	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Northrop Grumman : Charlottesville, VA	27.542	7.444	Dec 2017	4.736	Jan 2019	2.800	Mar 2020	-		2.800	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	SPAWAR Atlantic : Charleston, SC	1.530	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC Philadelphia : Philadelphia, PA	0.550	0.187	Feb 2018	0.000		0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Electric Boat : Groton, CA	0.953	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	John Hopkins, APL : Laurel, MD	1.638	3.342	Aug 2018	1.180	Jan 2019	10.216	Dec 2019	-		10.216	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Draper : Cambridge, MA	1.475	0.000		0.000		1.500	Dec 2019	-		1.500	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC Crane : Crane, IN	0.060	0.061	Nov 2017	0.000		0.000		-		0.000	0.000	0.121	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204228N / *Surface Support*	Project (Number/Name) 3311 / *Navigation Systems*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering/ Design	WR	Submarine Special Projects : Washington, DC	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Systems Engineering/ Design	MIPR	COMOPTEVFOR : Norfolk, VA	0.000	0.021	Jun 2018	0.000		0.000		-		0.000	0.000	0.021	-
Systems Engineering/ Design	WR	SPAWAR 5.0 : San Diego, CA	0.000	0.093	Jul 2018	0.000		0.000		-		0.000	0.000	0.093	-
Systems Engineering/ Design	TBD	ACNS Contract : TBD	0.000	0.000		0.000		2.700	Mar 2020	-		2.700	0.000	2.700	-
Systems Engineering/ Design	TBD	Carnegie Mellon : Not Specified	0.000	0.000		0.000		0.400	Dec 2019	-		0.400	0.000	0.400	-
		Subtotal	55.144	19.587		9.028		34.206		-		34.206	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/CPFF	Various : Not Specified	5.272	1.000	Jan 2018	0.680	Jan 2019	2.183	Jan 2020	-		2.183	Continuing	Continuing	Continuing
		Subtotal	5.272	1.000		0.680		2.183		-		2.183	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	60.416	20.587		9.708		36.389		-		36.389	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

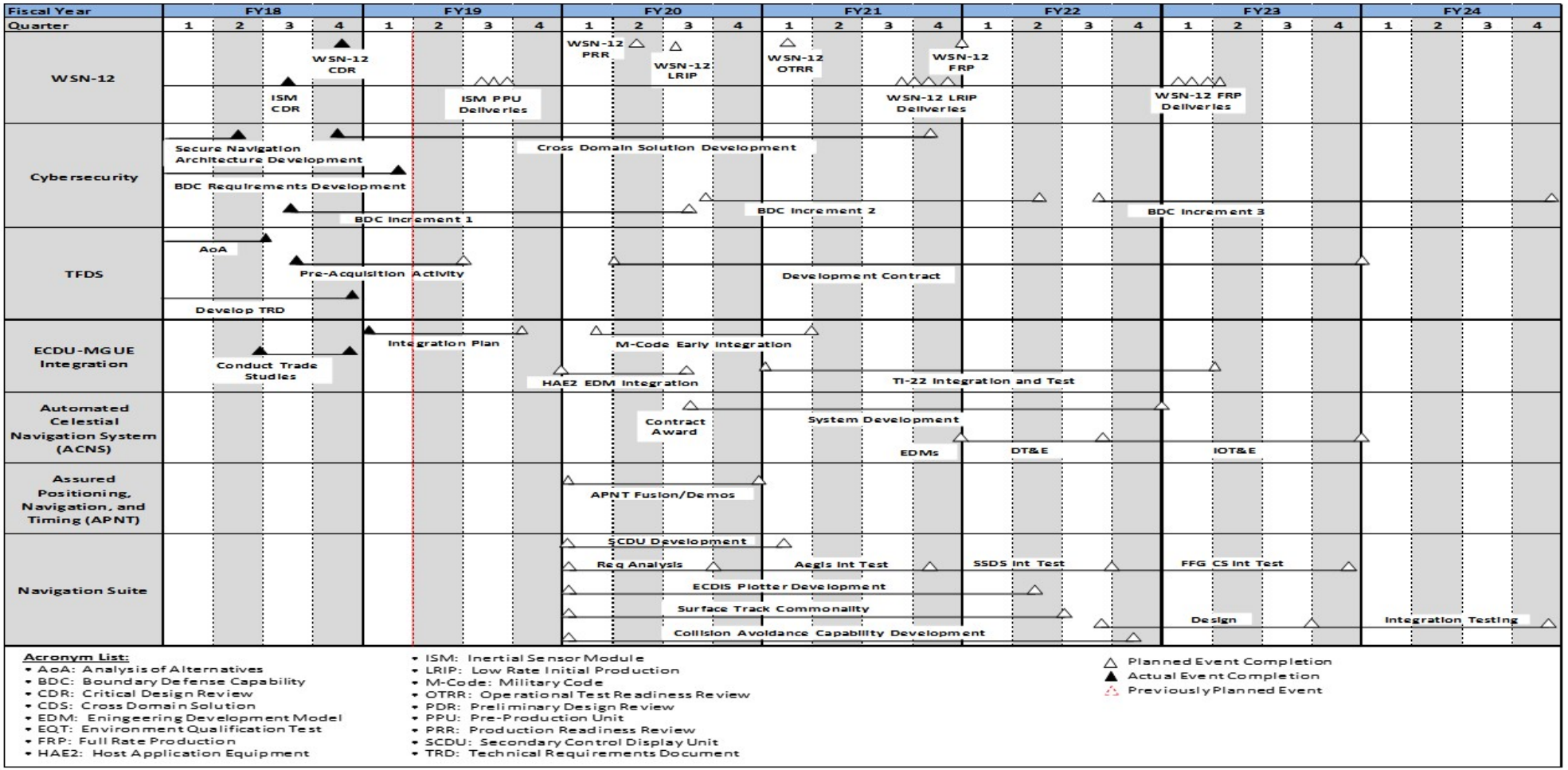

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3311				
ISM CDR	3	2018	3	2018
WSN-12 CDR	4	2018	4	2018
ISM PPU Deliveries	3	2019	3	2019
WSN-12 PRR	2	2019	2	2019
WSN-12 LRIP	3	2019	3	2019
WSN-12 OTRR	1	2021	1	2021
WSN-12 LRIP Deliveries	3	2021	4	2021
WSN-12 FRP	4	2021	4	2021
WSN-12 FRP Deliveries	1	2023	2	2023
Cybersecurity Secure Navigation Architecture Development	1	2018	2	2018
Cybersecurity Cross Doman Solution Development	4	2018	4	2021
Cybersecurity BDC Requirements Development	1	2018	1	2019
Cybersecurity BDC Increment 1	3	2018	3	2020
Cybersecurity BDC Increment 2	3	2020	2	2022
Cybersecurity BDC Increment 3	3	2022	4	2024
TFDS AoA	1	2018	2	2018
TFDS Develop TRD	1	2018	4	2018
TFDS Pre-Acquisition Activity	3	2018	2	2019
TFDS Development Contract	2	2020	4	2023
MGUE Trade Studies	2	2018	4	2018
MGUE Integration Plan	1	2019	4	2019
MGUE HAE2 EDM Integration	1	2020	3	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *Surface Support*	**Project (Number/Name)** 3311 / *Navigation Systems*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MGUE M-Code Early Integration	1	2020	1	2021
MGUE TI-22 Integration and Test	1	2021	2	2023
ACNS System Development	3	2020	4	2022
ACNS EDM Delivery	4	2021	4	2021
ACNS DT&E	4	2021	3	2022
ACNS IOT&E	3	2022	4	2023
APNT Fusion/Demos	1	2020	4	2020
Navigation Suite SCDU Development	1	2020	1	2021
Navigation Suite Requirements Analysis	1	2020	4	2020
Navigation Suite Aegis Integration Testing	4	2020	4	2021
Navigation Suite SSDS Integration Testing	4	2021	4	2022
Navigation Suite FFG CS Integration Testing	4	2022	4	2023
Navigation Suite ECDIS Plotter Development	1	2020	2	2022
Navigation Suite Surface Track Commonality	1	2020	3	2022
Navigation Suite Collision Avoidance Capability Development	1	2020	4	2022
Navigation Suite Design	3	2022	3	2023
Navigation Integration Testing	3	2023	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204229N *I Tomahawk Mssn Planning Ctr*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	3,214.265	100.011	252.395	320.134	-	320.134	199.250	123.075	52.155	53.196	Continuing	Continuing
0545: *TOMAHAWK*	3,214.265	100.011	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3,314.276
4032: *A2AD*	0.000	0.000	4.835	4.144	-	4.144	0.000	0.000	0.000	0.000	0.000	8.979
4033: *M-Code*	0.000	0.000	21.760	28.912	-	28.912	14.569	3.964	12.800	3.672	Continuing	Continuing
4034: *Maritime Strike*	0.000	0.000	185.380	227.854	-	227.854	125.138	71.925	0.000	0.000	0.000	610.297
4035: *JMEWS*	0.000	0.000	17.031	41.226	-	41.226	45.543	37.021	21.487	31.298	Continuing	Continuing
4036: *TTWCS TMPC PPPI*	0.000	0.000	23.389	17.998	-	17.998	14.000	10.165	17.868	18.226	Continuing	Continuing

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 289

A. Mission Description and Budget Item Justification

The Block V is a modernized TACTOM missile which includes the Navigation / Communications (NAV/COMMs) upgrade. NAV/COMMs is a title replacement for Anti-Access, Area Denial (A2AD). Funds support development of the Tomahawk Weapons System (TWS) encompassing Tactical Tomahawk upgrades including baseline improvements into the Block V missile All-Up Round (AUR), Tactical Tomahawk Weapons Controls System (TTWCS), Theater Mission Planning Center (TMPC) upgrades and other missile system improvements to maintain pace with threats. The TWS provides a long range cruise missile attack capability against fixed and mobile targets. Tomahawk is capable of being deployed from both submarines and surface ships and significantly increases the total capability of joint forces.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under Operational Systems Development because it includes development efforts to upgrade systems that have been fielded or have received approval for Full Rate Production (FRP) and anticipate funding in the current or subsequent fiscal year.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0204229N *I Tomahawk Mssn Planning Ctr*			
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	133.617	282.395	223.615	-	223.615
Current President's Budget	100.011	252.395	320.134	-	320.134
Total Adjustments	-33.606	-30.000	96.519	-	96.519
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-30.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.861	0.000			
• Program Adjustments	0.000	0.000	96.645	-	96.645
• Rate/Misc Adjustments	0.000	0.000	-0.126	-	-0.126
• Congressional Directed Reductions Adjustments	-31.745	-	-	-	-

Change Summary Explanation

Technical: Not applicable

Schedule:

PU 0545: Tomahawk schedule changes are associated with enhanced detail required to independently display program cost, schedule, and performance within the R-4 exhibit.

Moved M-Code EMD Phase I to PU 4033

A2AD Award Lot-1 was moved from 2Q FY 2018 of PU 0545 to 1Q FY2019 of PU 4032

PU 4032: A2AD schedule changes are due to the dependence of recertification line prove-in missiles which are now delayed as a result of changes in the recertification and modernization schedule.

A2AD Award Lot-1 was added and moved from 2Q FY 2018 of PU 0545 to 1Q FY2019 of PU 4032, causing Award Lots 2, 3, 4, 5 and 6 to shift accordingly.

Moved A2AD Modification Blk IV Fleet Release from 3Q FY2021 to 4Q FY2020

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204229N *I Tomahawk Mssn Planning Ctr*

Moved A2AD OTRR from 4Q FY2020 to 3Q FY2020 in accordance with A2AD Acquisition Strategy Acquisition Plan.

Added A2AD Functional Ground Test 3Q FY2019

Changed A2AD Operational Test (OT) from 4Q FY2020 to 3Q FY2020

PU 4033: M-Code schedule changes are associated with enhanced details required to independently display program cost, schedule, and performance within the R-4 exhibit.

Moved MS B from 1Q FY2019 to 3Q FY2019

Moved MS C from 1Q FY2021 to 1Q FY2023

Moved M-Code Fleet Release from 4Q FY2023 to 1Q FY2025

Added M-Code PDR to 2Q FY2020

Moved M-Code CDR from 3Q FY2019 TO 4Q FY2020

Moved M-Code DT from 1Q FY2019 to 4Q FY2020 to 3Q FY2020 through 1Q FY2023

Moved M-Code OT from 1Q FY2021 to 2Q FY2023 to 2Q FY2023 to 3Q FY2025

Added M-Code EMD Award Phase I from 2Q FY2018 to 3Q FY2019

Moved M-Code EMD Award Phase II from 2Q FY2019 to 1Q FY2021

Changed naming convention of LRIP to Lots. M-Code Lot-1 was shifted from 1Q FY2021 to 1Q FY2023. M-Code Lot-2 shifted from 1Q FY2022 to 1Q FY2024. Lot-3 was deleted.

PU 4034: Maritime Strike schedule changes are due to the dependence of recertification line prove in missiles which are now delayed as a result of changes in the recertification and modernization schedule.

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Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204229N *I Tomahawk Mssn Planning Ctr*

Moved Maritime Strike IOC from 4Q FY2021 to 4Q FY2022

Moved Maritime Strike Simulation Capability from 1Q FY2020 to 3Q FY2020

Moved Maritime Strike Ready for Ground Launches from 3Q FY2020 to 2Q FY2021

Moved Maritime Strike Modeling and Simulation from 1Q FY2019 to 3Q FY2021 to 1Q FY2019 to 4Q FY2021

Moved Maritime TTWCS Dev from 1Q FY2019 to 2Q FY2021 to 1Q FY2019 to 3Q FY2021

Moved Maritime Strike Ready for QRA from 2Q FY2021 to 2Q FY2022

Moved Maritime QRA from 2Q FY2021 to 2Q FY2022 through 3Q FY2022

Moved Maritime Strike Initial Fielding from 4Q FY 2021 to 4Q FY 2022

Added Maritime Production Contract Award LRIP 1 from 1Q FY2020

Added Maritime Production Contract Award LRIP 2 from 1Q FY2021

Added Maritime Production Contract Award LRIP 3 from 1Q FY2022

Added Maritime Production Contract Award from 1Q FY2023

PU 4035: JMEWS schedule changes are associated with enhanced details required to independently display program cost, schedule, and performance within the R-4 exhibit.

Moved MS B from 2Q FY2019 to 4Q FY2019

Moved MS C from 1Q FY2023 1Q FY2024

Moved JMEWS Fuze Risk Reduction from 1Q FY2019 to 3Q FY2019 to 3Q FY2018 to 4Q FY2019

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204229N *I Tomahawk Mssn Planning Ctr*

Moved JMEWS PDR from 1Q FY2020 to 3Q FY2020

Moved JMEWS CDR from 4Q FY2020 to 2Q FY2021

Moved JMEWS DT from 4Q FY2020 to 1Q FY2023 to 2Q FY2021 to 4Q FY2023

Moved JMEWS OT from 2Q FY2023 to 4Q FY2023 to 1Q FY2024 to 4Q FY2024

Moved JMEWS Long-Lead Energetics Award from 1Q FY2022 to 1Q FY2024

Moved JMEWS Production Contract Award from 1Q FY2023 to 4Q FY2025

PU 4036: TTWCS TMPC PPPI schedule changes are associated with enhanced details required to independently display program cost, schedule, and performance within the R-4 exhibit.

Moved TMPC 7.0 IOC from 4Q FY2021 to 4Q FY2022

Moved TMPC 7.0 PAT & DT/OT from 1Q FY2020 to 4Q FY2021 to 1Q FY2021 to 4Q FY2022

Moved TMPC 8.0 Requirements Definition from 2Q FY2019 to 4Q FY2019 to 4Q 2019 to 4Q FY2020

Moved TMPC 8.0 PAT & DT/OT from 3Q FY2022 to 1Q FY2024 to 2Q FY2024 to 4Q FY2025

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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0545: *TOMAHAWK*	3,214.265	100.011	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3,314.276
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 289

A. Mission Description and Budget Item Justification

The Tomahawk Weapons System (TWS) provides a long range cruise missile attack capability against fixed and mobile/moving targets and can be launched from both surface ships submarines. TWS employs state of the art technology to preserve the efficiency of this proven weapon system, and includes all missile development, mission planning, weapons control system development, and submarine integration development. Tomahawk missiles consist of the following variants: (1) Block III, consisting of the RGM/UGM-109C Land Attack Conventional version and the RGM/UGM-109D Land Attack Submunition Dispenser variant; (2) Block IV, RGM/UGM-109E Tactical Tomahawk; (3) Block V, RGM/UGM-109E Modernized Tactical Tomahawk with a NAV/COMMs upgrade. All Block IV missiles that go through recertification will be converted into Block V missiles, and FY 2020 procured new production missiles will be delivered in a Block V configuration.

The essential upgrades of the Block V Tomahawk missile are more robust navigation and two-way satellite communication (SATCOM). Block V provides a dual-band SATCOM data link to enable the missile to receive In-flight Mission Modification Messages, to transfer Health and Status messages and to broadcast Battle Damage Indication messages. A Block V also includes development of continuing advances in GPS navigation (M-Code), Maritime Strike, and warhead design (JMEWS).

Tactical Tomahawk baseline improvements include the following:

(1) NAV/COMMs, also known as Anti-Access/Area Denial (A2AD), upgrade the navigation software, replace the existing Satellite Data Link Terminal (SDLT) radio with a dual-band SATCOM Integrated Single Box Solution (ISBS) radio and accompanying antennas. The NAV/COMMs upgrade allow for planned missions using Terrain Contour Matching (TERCOM)/Digital Scene Matching Area Correlation (DSMAC) updates without GPS and continues communication to pass Health and Status messages and allow missile redirection inflight. NAV/COMM program includes upgrades to the All-Up Round (AUR) missile, Tactical Tomahawk Weapons Control System (TTWCS) and Theater Mission Planning Center (TMPC).

(2) MARITIME STRIKE TOMAHAWK provides the capability to hit moving maritime targets through mid-course guidance via a third party or seeker mode, to a terminal seeker area of uncertainty. Maritime Strike Tomahawk program includes upgrades to the AUR missile, TTWCS, and TMPC.

(3) M-CODE (ACAT IV) is the next generation, modernized Global Positioning System (GPS) signal-in-space broadcast for enhanced Position, Navigation, and Timing (PNT) capability. The mission of the Tomahawk Weapon System (TWS) M-Code Integrated Product Team (IPT) is to deliver the necessary modifications to the Tomahawk Block IV missile and associated upgrades to the Tactical Tomahawk Weapons Control System (TTWCS) and Theater Mission Planning Center (TMPC) to enable the TWS to utilize the M-Code capability. Enhancements include improved GPS signal integrity. M-Code program includes upgrades to the AUR missile, TTWCS, and TMPC.

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(4) JMEWS (ACAT III) is a new warhead for the Block V Tomahawk Cruise Missile. JMEWS will greatly expand the land target set that the Tomahawk missile is capable of defeating, by combining the blast and fragmentation capabilities of the current warhead with a new penetration capability and improved mission planning. JMEWS will also be compliant with Insensitive Munitions requirements which improve safety during transportation and storage on land and aboard ships and submarines. JMEWS program includes upgrades to the AUR missile, TTWCS, and TMPC.

The Theater Mission Planning Center (TMPC) consists of Commercial and Government Off-The-Shelf (COTS/GOTS) software and COTS hardware. TMPC is the mission planning segment of the Tomahawk Weapon System (TWS) that provides subsystems for the precision targeting, route planning, mission distribution, and strike management of Tomahawk cruise missile missions from sites located ashore and afloat. TMPC optimizes all aspects of the Tomahawk missile mission to successfully engage a target.

TMPC provides mission planning at the theater and operational levels and is designed for high rate mission planning production responsive to national strategic, operational, and tactical requirements. TMPC develops and distributes missions; provides command information services for all variants of the Tomahawk missile; provides strike planning, execution, coordination, control and reporting, and provides Maritime Component Commanders (MCC) the capability to plan or modify conventional TWS missions. TMPC is employed in major joint combat operations and Overseas Contingency Operations. TMPC has evolved into 4 scalable configurations deployed at 189 sites: Cruise Missile Support Activities (CMSAs) (3), Tomahawk Strike Mission Planning Cells (TSMPCs) (3), Carrier Strike Groups (CSGs) (19 - 10 CVN), and Firing Units (FRUs) (145 - 88 Surface / 57 Subsurface). Additionally, TMPC is installed in Labs (6) and Training Classrooms (13) that contain various combinations of the four configurations. TMPC software development activities support new capabilities for the Tomahawk Weapon System while also decreasing mission planning time, increasing the quality and accuracy of each mission and reducing complexity. TMPC was previously referred to as Tomahawk Command and Control System (TC2S).

The Tactical Tomahawk Weapons Control System (TTWCS) provides launch capability for surface and submarine platforms. Development of the TTWCS provides a common architecture to launch the TACTOM and all variants in inventory. Development of upgrades to the TTWCS is required to meet the Department of Defense Information Technology Standards Registry, to meet FORCEnet compliance and be Internet Protocol Version 6 ready in order to remain interoperable within the Joint Service Architecture and to retain weapons system viability and usability for our Sailors.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Tactical Tomahawk All-Up-Round (AUR) and Tactical Tomahawk Weapons Control System (TTWCS)	88.796	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Continue Anti-Access/Area Denial (A2AD) navigation and communication integration into Block IV weapons system. Continue fleet experimentation and requirements coordination as well as Concept of Operations (CONOPS)/ Concept of Employment development. Continuation of the design and integration of the seeker suite into the Tactical Tomahawk (TACTOM) to be incorporated during recertification. Continuation of the cooperatively funded United States Navy/United Kingdom Joint Multi-Effects Warhead System (JMEWS) / Joint					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Capability Technology Demonstration (JCTD) and the commencement of fuze technology maturation and risk-reduction. Include significant research and analysis of the worldwide target set capability gaps to include Hard and Deeply Buried Targets and conventional Global Strike targets. In addition, NAWCAD also provides engine power data/analysis in order to determine reserve power available to power potential upgrades to the Tomahawk AUR, such as JMEWS. Continue development of activities associated with Military Global Positioning System User Equipment (MGUE) Insertion. In addition, the Maritime Strike Tomahawk modernization effort provides the capability to hit moving maritime targets through mid-course guidance via a third party or seeker mode, to a terminal seeker area of uncertainty in an A2AD environment. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Theater Mission Planning Center (TMPC) ***Articles:*** ***Description:*** Development and incorporation of new capabilities into the Theater Mission Planning Center (TMPC) necessary for the employment of the Tomahawk Weapon System (TWS). ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	11.215 -	0.000 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	100.011	0.000	0.000	0.000	0.000

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN/2101: *Tomahawk*	187.354	98.570	386.730	-	386.730	373.963	220.141	317.815	280.825	1,438.643	16,756.166
• OPN/5253: *Tomahawk Support Equipment*	73.184	86.045	78.593	-	78.593	95.438	108.493	86.741	85.304	Continuing	Continuing
• OPN/9020: *Initial and Vendor Direct Spares*	0.311	0.365	0.095	-	0.095	0.180	0.199	0.219	0.223	Continuing	Continuing
• WPN/6120: *Spares and Repair Parts*	13.518	25.096	23.801	-	23.801	19.575	18.707	22.499	22.949	Continuing	Continuing

Remarks

D. Acquisition Strategy

TACTOM Weapon System (ACAT I) achieved IOC in May 2004. The current acquisition strategy is to maintain production through 2021. The current operational life of a fielded TACTOM BLK IV missile is 15 years. Starting in FY 2019 these missiles will start reaching their Maintenance Due Date (MDD). The TACTOM Recertification Program (ACAT II) will overhaul each end-of-life missile enabling the missile to be operational for an additional 15 years of service. During missile recertification the NAV/COMM upgrade will be added to the missile, transitioning to a Block V missile. New production that occurs in FY 2020 and beyond will be in a baseline Block V configuration.

Maritime Strike Tomahawk (MST) will enable surface warfare engagement capability from U.S. Navy Guided Missile Cruiser (CG), Guided Missile Destroyer (DDG), and Nuclear Powered Fast Attack Submarine (SSN) platforms. MST was designated a DoDI 5000.02 Rapid Deployment Capability (RDC) by the Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN (RDA)) in Oct 2016. Initial Operational Capability (IOC) will occur in FY 2022 following a Quick Reaction Assessment (QRA) and characterization of operational performance. This strategy affords the program flexibility in achieving a threshold capability in a timely manner. Following IOC, further procurements will comply with DoDI 5000.02 as a program of record. The MST program includes upgrades to the AUR missile, TTWCS and TMPC.

The M-Code (ACAT IV) acquisition strategy includes the development, integration, test, qualification and production of a new GPS receiver which will satisfy Public Law 111-383, sec 913 compliance. M-Code capability enables the missile to maintain GPS integrity in an enhanced spoofing environment. M-Code Milestone B will occur in FY 2019, Milestone C is planned for FY 2023, and the capability will Fleet Release in FY 2025. The M-Code program includes upgrades to the AUR missile, TTWCS and TMPC.

Joint Multiple Effects Warhead System (JMEWS) (ACAT III) acquisition strategy includes the development, integration, test, qualification and production of a new warhead that will greatly expand the land target set that the Tomahawk missile is capable of defeating, by combining the blast and fragmentation capabilities of the current warhead with a new penetration capability and improved mission planning. JMEWS will also be compliant with Insensitive Munitions requirements which improve

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safety during transportation and storage on land and aboard ships and submarines. JMEWS Milestone B will occur in FY 20129, Milestone C is planned for FY 2024, and the capability will Fleet Release in FY 2025. JMEWS program includes upgrades to the AUR missile, TTWCS, and TMPC.

TMPC and TTWCS require periodic hardware and software updates to maintain compliance with IA standards and maintain system relevance against emerging threats. TMPC and TTWCS segments will rely on a blend of industry and government expertise through the remaining life of the program.

E. Performance Metrics

The Navy seeks to improve the Tomahawk cruise missile attack capability against land and maritime targets through research and development.

Examples in the area of the All-Up-Round include development of candidate warheads and sensors that will enhance weapon ability to cover all assigned target types, provide a quick reaction response capability for the weapon system, and improved guidance, navigation, control, mission computer two-way satellite communications, and a high anti-jam GPS receiver all in line with state of the art technology.

In the area of the weapons control system, research and development is performed to ensure viability and usability of the system into the future, providing necessary upgrades to meet the Department of Defense Information Technology standards registry to comply with FORCEnet requirements and be Internet Protocol Version 6 ready to remain interoperable within Joint Service Architecture, in order to provide battle-group tactical flexibility and responsiveness needed to enable full wartime capability.

In the area of the TMPC, research and development is performed in order to provide scalable configurations to deploy where and as needed to provide necessary command and control, conduct development necessary to function with national and tactical imagery architectures, support new TWS capabilities, decrease mission planning time, and increase the quality and accuracy of each mission for the TWS.

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering - A2AD Improvements Prime Integrator (NAV/ COMMS)	SS/CPFF	Raytheon : Tucson, AZ	25.425	11.615	Feb 2018	0.000		0.000		-		0.000	0.000	37.040	Continuing
Systems Engineering - TTWCS A2AD Improvements (NAV/ COMMS)	WR	NSWC : Dahlgren, VA	3.265	1.436	Feb 2018	0.000		0.000		-		0.000	0.000	4.701	Continuing
Systems Engineering - Hardware Development-A2AD Improvements (NAV/COMMS)	MIPR	NRO : Chantilly, VA	33.914	5.970	Nov 2017	0.000		0.000		-		0.000	0.000	39.884	Continuing
Systems Engineering-TTWCS Software Support Activity(NAV/COMMS)	SS/CPFF	LMVF : Valley Forge, PA	2.778	2.219	Feb 2018	0.000		0.000		-		0.000	0.000	4.997	Continuing
M-Code - TTWCS	WR	NSWC : Dahlgren, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
M-Code - AUR	C/CPFF	Raytheon : Tucson, AZ	0.000	2.100	Feb 2018	0.000		0.000		-		0.000	0.000	2.100	Continuing
M-Code- AUR	SS/FFP	Raytheon SAS : El Segundo, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
M-Code	WR	NSWC-IH : Indian Head, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
M-Code	WR	NUWC-RI : Newport, RI	0.000	0.086	Nov 2017	0.000		0.000		-		0.000	0.000	0.086	Continuing
M-Code	WR	NAWC-AD : Pax River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
M-Code - TMPC	SS/CPFF	Tapestry : St. Louis, MO	0.000	0.250	Dec 2017	0.000		0.000		-		0.000	0.000	0.250	Continuing
M-Code - TMPC	SS/CPFF	Vencore : SanJose, CA	0.000	0.136	Dec 2017	0.000		0.000		-		0.000	0.000	0.136	Continuing
Maritime Strike - TMPC	SS/CPFF	Vencore : San Jose, CA	0.530	2.103	Dec 2017	0.000		0.000		-		0.000	0.000	2.633	Continuing

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Maritime Strike - TMPC	SS/CPFF	Tapestry : St. Louis, MO	0.622	0.600	Dec 2017	0.000		0.000		-		0.000	0.000	1.222	Continuing
Maritime Strike - TMPC	SS/CPFF	BAE Systems : San Diego, CA	0.435	0.462	Dec 2017	0.000		0.000		-		0.000	0.000	0.897	Continuing
Maritime Strike - TMPC	SS/CPFF	Leidos : California, MD	0.999	0.823	Dec 2017	0.000		0.000		-		0.000	0.000	1.822	Continuing
Maritime Strike - TMPC	SS/CPFF	UARC APL : Laurel, MD	0.375	0.000		0.000		0.000		-		0.000	0.000	0.375	Continuing
Maritime Strike - TMPC	WR	NAWC-AD : Pax River, MD	0.126	0.606	Nov 2017	0.000		0.000		-		0.000	0.000	0.732	Continuing
Maritime Strike - TMPC	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Maritime Strike - AUR	C/CPFF	Raytheon : Tucson, AZ	9.400	50.242	Dec 2017	0.000		0.000		-		0.000	0.000	59.642	Continuing
Maritime Strike	SS/CPFF	UARC APL : Laurel, MD	0.000	0.088	Dec 2017	0.000		0.000		-		0.000	0.000	0.088	Continuing
Maritime Strike - TTWCS	WR	NSWC-DD : Dahlgren, VA	0.977	3.115	Nov 2017	0.000		0.000		-		0.000	0.000	4.092	Continuing
JMEWS - TMPC	SS/CPFF	Tapestry : St. Louis, MO	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Maritime Strike - TTWCS	SS/CPFF	LMVF : Valley Forge, PA	1.132	2.219	Dec 2017	0.000		0.000		-		0.000	0.000	3.351	Continuing
JMEWS - TMPC	SS/CPFF	BAE Systems : San Diego, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Maritime Strike - AUR	WR	NAWC-WD : China Lake, CA	0.521	0.000	Nov 2017	0.000		0.000		-		0.000	0.000	0.521	Continuing
JMEWS - TMPC	SS/CPFF	Leidos : California, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Maritime Strike - BRAT Dev	MIPR	AFRL : Dayton, OH	0.230	0.000		0.000		0.000		-		0.000	0.000	0.230	Continuing
JMEWS - TMPC	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JMEWS	WR	NAWC-WD : China Lake, CA	0.000	1.508	Nov 2017	0.000		0.000		-		0.000	0.000	1.508	Continuing
Prior Year Prod Dev cost no longer funded in the FYDP	Various	Various : Various	2,660.256	0.000		0.000		0.000		-		0.000	0.000	2,660.256	-
		Subtotal	2,740.985	85.578		0.000		0.000		-		0.000	0.000	2,826.563	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
A2AD Improvements (NAV/COMMS) - Mission Planning upgrade	SS/CPFF	Vencore : San Jose, CA	2.213	0.900	Feb 2018	0.000		0.000		-		0.000	0.000	3.113	Continuing
A2AD Improvements (NAV/COMMS) - Mission Planning upgrade	SS/CPFF	Boeing : St. Louis, MO	2.820	0.000		0.000		0.000		-		0.000	0.000	2.820	Continuing
A2AD Improvements (NAV/COMMS) - Mission Planning upgrade	SS/CPFF	BAE Systems : San Diego, CA	2.850	0.000		0.000		0.000		-		0.000	0.000	2.850	Continuing
A2AD Improvements (NAV/COMMS) - Mission Planning upgrade	SS/CPFF	Leidos : California, MD	5.001	1.482	Feb 2018	0.000		0.000		-		0.000	0.000	6.483	Continuing
A2AD Improvements (NAV/COMMS) - Mission Planning upgrade	SS/CPFF	UARC APL : Laurel, MD	2.623	0.000		0.000		0.000		-		0.000	0.000	2.623	Continuing
TLAM MP Analysis - Mission Planning	SS/CPFF	UARC APL : Laurel, MD	1.466	1.067	Feb 2018	0.000		0.000		-		0.000	0.000	2.533	Continuing
Imagery Format Analysis - Mission Planning	SS/CPFF	Leidos : California, MD	6.000	1.618	Feb 2018	0.000		0.000		-		0.000	0.000	7.618	Continuing
A2AD Improvements (NAV/COMMS) - Mission Planning upgrade	WR	NAWC-AD : Pax River, MD	1.024	1.220	Feb 2018	0.000		0.000		-		0.000	0.000	2.244	Continuing

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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support - TTWCS AUR	WR	NSWC : Dahlgren, VA	4.067	0.000		0.000		0.000		-		0.000	0.000	4.067	Continuing
Development Support - CSS AUR	SS/CPFF	Leidos : California, MD	1.539	0.000		0.000		0.000		-		0.000	0.000	1.539	Continuing
Development Support - Advanced Concepts AUR	WR	NAWC-WD : China Lake, CA	82.067	0.559	Nov 2017	0.000		0.000		-		0.000	0.000	82.626	Continuing
Development Support - AUR Fleet Representative	SS/CPFF	UARC APL : Laurel, MD	0.497	0.330	Nov 2017	0.000		0.000		-		0.000	0.000	0.827	Continuing
Development Support - Advanced Concepts AUR	WR	NAWC-AD : Pax River, MD	0.753	0.105	Nov 2017	0.000		0.000		-		0.000	0.000	0.858	Continuing
Development Support - Advanced Concepts AUR	WR	NSWC : Dahlgren, VA	0.396	0.425	Nov 2017	0.000		0.000		-		0.000	0.000	0.821	Continuing
Development Spt - CSS AUR	C/BA	Precise : Lexington Park, MD	0.180	0.230	Dec 2017	0.000		0.000		-		0.000	0.000	0.410	Continuing
Development Spt - M-Code	C/BA	UARC APL : Laurel, MD	0.000	0.439	Dec 2017	0.000		0.000		-		0.000	0.000	0.439	Continuing
M-Code AUR	WR	NUWC-NPT : Newport, RI	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
M-Code AUR	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
M-Code AUR	WR	NSWC-IH : Indian Head, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
M-Code TWS	C/BA	Precise : Lexington Park, MD	0.000	0.056	Apr 2018	0.000		0.000		-		0.000	0.000	0.056	Continuing
M-Code TTWCS	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
M-Code TTWCS	C/BA	UARC APL : Laurel, MD	0.000	0.100	May 2018	0.000		0.000		-		0.000	0.000	0.100	Continuing
M-Code TTWCS	SS/CPFF	LMVF : Valley Forge, PA	0.000	0.515	Mar 2018	0.000		0.000		-		0.000	0.000	0.515	Continuing
M-Code TTWCS	SS/CPFF	LMBM : Baltimore, MD	0.000	0.065	May 2018	0.000		0.000		-		0.000	0.000	0.065	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 0545 / *TOMAHAWK*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M-Code TTWCS	WR	NUWC-NPT : Newport, RI	0.000	0.086	Nov 2017	0.000		0.000		-		0.000	0.000	0.086	Continuing
Development Spt - Maritime Strike	WR	NUWC-NPT : Newport, RI	0.188	0.380	Nov 2017	0.000		0.000		-		0.000	0.000	0.568	Continuing
Development Spt - Maritime Strike	WR	NAWC-WD : China Lake, CA	0.000	1.742	Nov 2017	0.000		0.000		-		0.000	0.000	1.742	Continuing
Development Spt - Maritime Strike	SS/CPFF	NSWC-DD : Dahlgren, VA	0.500	0.717	Nov 2017	0.000		0.000		-		0.000	0.000	1.217	Continuing
Development Spt - Maritime Strike	WR	NAWC-AD : Pax River, MD	0.865	1.385	Nov 2017	0.000		0.000		-		0.000	0.000	2.250	Continuing
Prior Year Support cost no longer funded in FYDP	Various	Various : Various	274.418	0.000		0.000		0.000		-		0.000	0.000	274.418	Continuing
Development Spt - JMEWS	WR	NAWC-AD : Pax River, MD	0.000	0.068	Apr 2018	0.000		0.000		-		0.000	0.000	0.068	-
Development Spt - JMEWS (CSS)	C/BA	Engility : Lexington Park, MD	0.000	0.100	Apr 2018	0.000		0.000		-		0.000	0.000	0.100	-
		Subtotal	389.467	13.589		0.000		0.000		-		0.000	0.000	403.056	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Maritime Strike	C/CPFF	Raytheon : Tucson, AZ	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Maritime Strike	WR	NAWC-AD : China Lake, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Maritime Strike	WR	NAWC-WD : Pax River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Maritime Strike	WR	NSWC : Dahlgren, VA	0.000	0.485	Dec 2017	0.000		0.000		-		0.000	0.000	0.485	Continuing
TTWCS	WR	NSWC-DD : Dahlgren	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 0545 / *TOMAHAWK*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M-Code	WR	NAWC-AD : Patuxent River, MD	0.000	0.359	Nov 2017	0.000		0.000		-		0.000	0.000	0.359	Continuing
A2AD Improvements (NAV/COMMS)	SS/CPFF	NSWC-IHD : Indian Head, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
A2AD Improvements (NAV/COMMS)	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Prior Year T&E cost no longer funded in FYDP	Various	Various : Various	83.412	0.000		0.000		0.000		-		0.000	0.000	83.412	Continuing
		Subtotal	83.412	0.844		0.000		0.000		-		0.000	0.000	84.256	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M-Code	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	Continuing
Prior Year Mgmt cost no longer funded in FYDP	Various	Various : Various	0.401	0.000		0.000		0.000		-		0.000	0.000	0.401	Continuing
		Subtotal	0.401	0.000		0.000		0.000		-		0.000	0.000	0.401	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3,214.265	100.011		0.000		0.000		-		0.000	0.000	3,314.276	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 0545 / *TOMAHAWK*

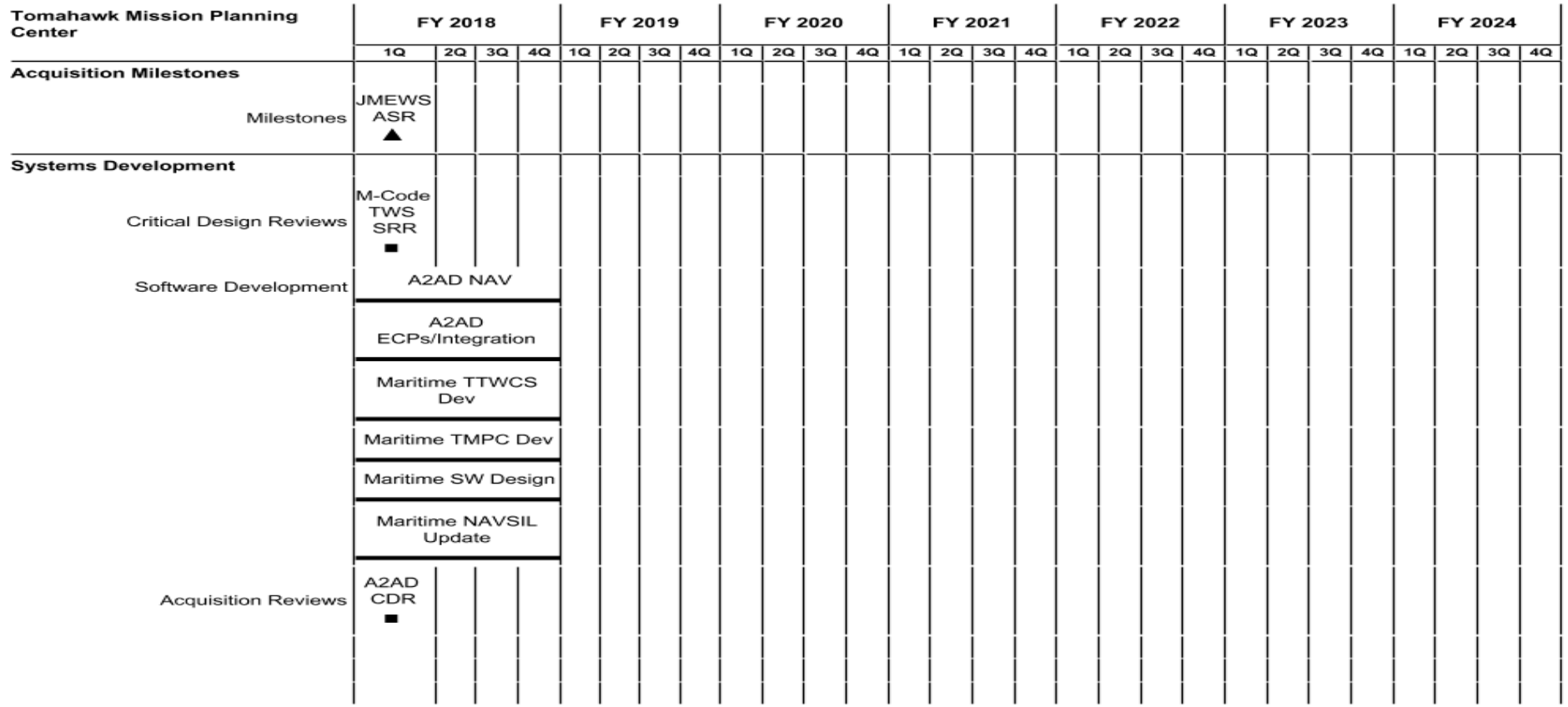

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 0545 / *TOMAHAWK*

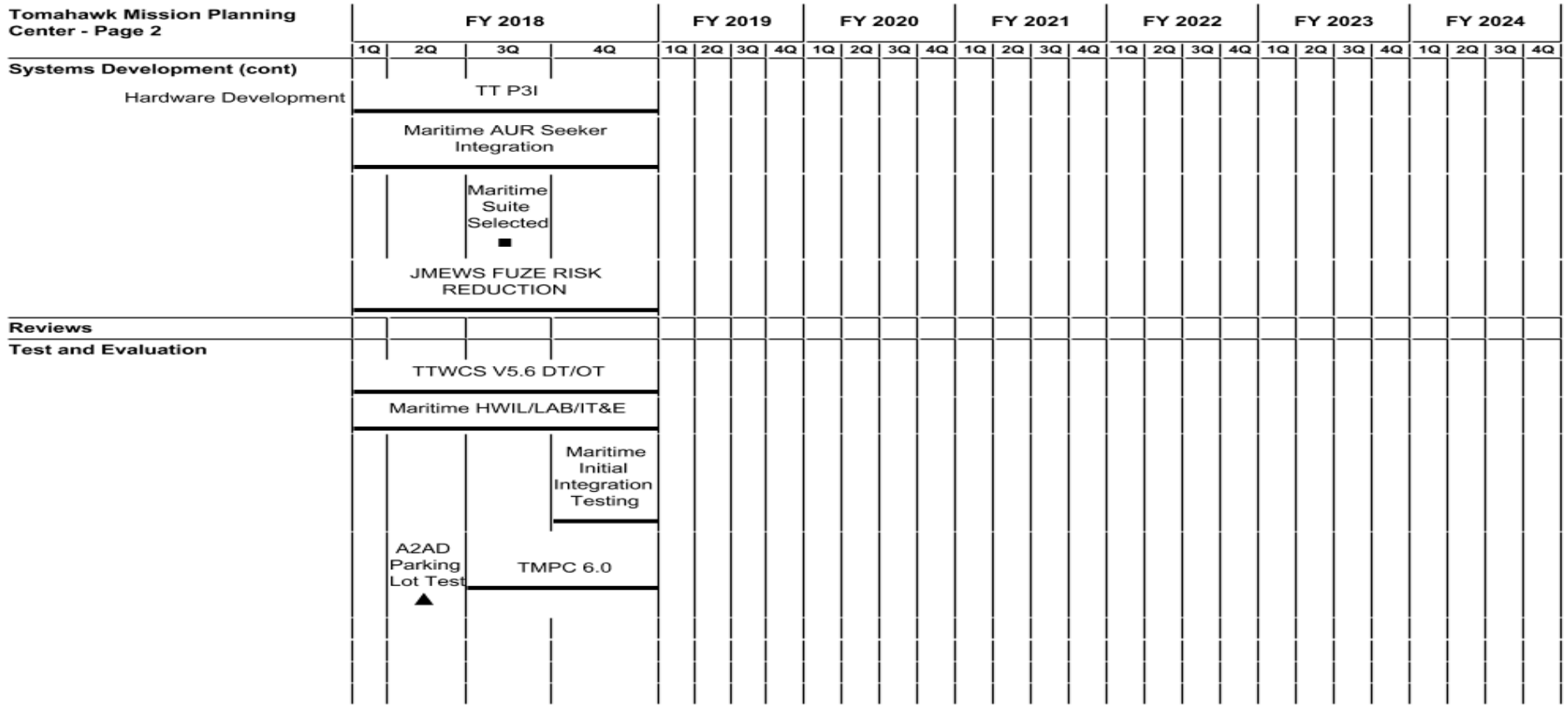

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 0545 / *TOMAHAWK*

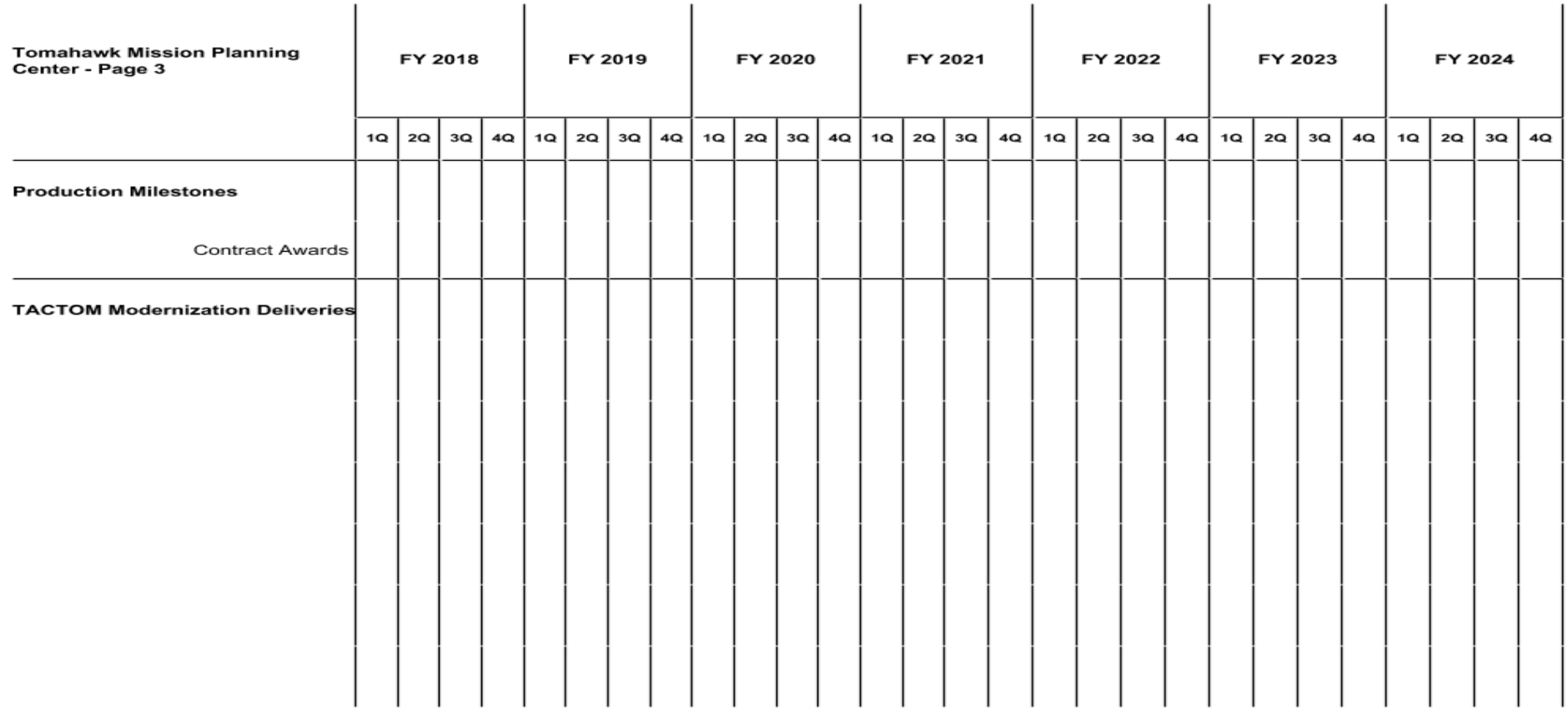

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 0545 / *TOMAHAWK*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Tomahawk Mission Planning Center				
Acquisition Milestones: Milestones: JMEWS Acquisition Strategy Review	1	2018	1	2018
Systems Development: Critical Design Reviews: M-CodeTWS SRR	1	2018	1	2018
Systems Development: Software Development: A2AD Navigation	1	2018	4	2018
Systems Development: Software Development: A2AD ECPs/Integration	1	2018	4	2018
Systems Development: Software Development: Maritime Strike- TTWCS Development	1	2018	4	2018
Systems Development: Software Development: Maritime Strike- TMPC Development	1	2018	4	2018
Systems Development: Software Development: Maritime Strike Software Design	1	2018	4	2018
Systems Development: Software Development: Maritime Strike NAVSIL Update	1	2018	4	2018
Systems Development: Acquisition Reviews: A2AD - CDR	1	2018	1	2018
Tomahawk Mission Planning Center - Page 2				
Systems Development (cont): Hardware Development: TT Preplanned Product Improvement (P3I)	1	2018	4	2018
Systems Development (cont): Hardware Development: Maritime Strike - AUR Seeker Integration	1	2018	4	2018
Systems Development (cont): Hardware Development: Maritime Strike Suite Selected	3	2018	3	2018
Systems Development (cont): Hardware Development: JMEWS FUZE RISK REDUCTION	1	2018	4	2018
Test and Evaluation: TTWCS V5.6 Modernized Missile DT/OT	1	2018	4	2018
Test and Evaluation: Maritime Strike - HWIL/LAB/Integration Testing	1	2018	4	2018
Test and Evaluation: Maritime Strike Initial Integration Testing	4	2018	4	2018
Test and Evaluation: TMPC 6.0	3	2018	4	2018
Test and Evaluation: A2AD Parking Lot Test	2	2018	2	2018

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 0545 / *TOMAHAWK*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Tomahawk Mission Planning Center - Page 3				
TACTOM Modernization Deliveries: TACTOM Modernization Deliveries	4	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4032 / *A2AD*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
4032: *A2AD*	0.000	0.000	4.835	4.144	-	4.144	0.000	0.000	0.000	0.000	0.000	8.979
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 289

A. Mission Description and Budget Item Justification

This project funds Anti-Access / Area Denial (A2AD) engineering change proposal (ECP) upgrades to the navigation and communication of the Tactical Tomahawk (TACTOM). TACTOM navigation modernization will enable launch via a fine alignment solution and navigation using TERCOM/DSMAC/Vertical Update Point in a GPS denied/degraded environment. TACTOM communications development replaces 5Khz DAMA with Advanced Communication Architecture (ACA) leveraging National Technical Means (NTM), replacing the Satellite Data Link Terminal (SDLT) with an Integrated Single Box Solution (ISBS) that combines Dual Transmit and Receive Capability in a single box, replacing existing UHF antenna and adding a second band antenna.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Anti-Access/Area Denial	0.000	4.835	4.144	0.000	4.144
Articles:	-	-	-	-	-

FY 2019 Plans:

FY 2019 plans include A2AD(NAV/COMMS) identification of the kit bill of materials, logistics, fabrication, assembly, integration, test, and documentation of prototype kits for the Functional Ground Test (FGT), flight test, and associated procedures. Includes the completion of the FGT and technical assessments of data collected. Continue program management and engineering support for navigation and communication system upgrades completion of the Engineering Change Proposal (ECP). Continue technical engineering support to the Integrated Single Box Solution (ISBS) radio developer and Advanced Communication Architecture (ACA) Network Service Provider. Complete the AUR System Verification Review (SVR) and Operational Test Readiness Review (OTRR).

FY 2020 Base Plans:

FY 2020 plans include A2AD(NAV/COMMS) the continuation of technical engineering support for the Integrated Single Box Solution (ISBS) radio developer and Advanced Communication Architecture (ACA) Network Service Provider. Complete the AUR Operational Test Readiness Review (OTRR), Operational Test (OT) and Fleet Release.

FY 2020 OCO Plans:

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4032 / *A2AD*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.691 million from FY 2019 to FY 2020 associated with the transition from primarily product development activities to test.					
Accomplishments/Planned Programs Subtotals	0.000	4.835	4.144	0.000	4.144

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN 2101: *Tomahawk*	187.354	98.570	386.730	-	386.730	373.963	220.141	317.815	280.825	1,438.643	16,756.166
• OPN 5253: *Tomahawk Support Equipment*	73.184	86.045	78.593	-	78.593	95.438	108.493	86.741	85.304	Continuing	Continuing
• OPN 9020: *Initial and Vendor Direct Spares*	0.311	0.365	0.095	-	0.095	0.180	0.199	0.219	0.223	Continuing	Continuing
• WPN 6120: *Spares and Repair Parts*	13.518	25.096	23.801	-	23.801	19.575	18.707	22.499	22.949	Continuing	Continuing

Remarks

D. Acquisition Strategy

Tactical Tomahawk communications and navigation development is funded via the National Reconnaissance Office (NRO) and Raytheon Missile Systems to include the development of either multiple or multi-band antennas, for the integrated single box solution radio. These changes will be incorporated during missile recertification scheduled to begin in FY 2020.

E. Performance Metrics

The Navy seeks to improve the Tomahawk cruise missile attack capability against land and maritime targets through research and development.

Examples in the area of the All-Up-Round include development of improved navigation, control, and mission computer two-way satellite communications, all in line with state of the art technology.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4032 / *A2AD*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
A2AD Improvements Prime Integrator (NAV/ COMMS)	SS/CPFF	Raytheon : Tucson, AZ	0.000	0.000		0.750	Nov 2018	0.000		-		0.000	0.000	0.750	-
Hardware Development-A2AD Improvements (NAV/COMMS)	MIPR	NRO : Chantilly, VA	0.000	0.000		2.100	Nov 2018	1.507	Dec 2019	-		1.507	0.000	3.607	-
		Subtotal	0.000	0.000		2.850		1.507		-		1.507	0.000	4.357	N/A

Remarks

FY 2020 A2AD Product Development funding required to complete hardware development to include the development of either multiple or multi-band antennas for the integrated single box solution radio.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
A2AD Development Support	WR	NAWC-AD : Pax River, MD	0.000	0.000		0.170	Nov 2018	1.558	Nov 2019	-		1.558	0.000	1.728	-
A2AD Development Support	WR	NAWC-WD : China Lake, CA	0.000	0.000		0.665	Dec 2018	0.332	Dec 2019	-		0.332	0.000	0.997	-
		Subtotal	0.000	0.000		0.835		1.890		-		1.890	0.000	2.725	N/A

Remarks

Increase in Development Support funding in FY 2020 required for support to scheduled test events and test reviews.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
A2AD Test & Evaluation	WR	NAWC-WD : China Lake, CA	0.000	0.000		0.625	Nov 2018	0.747	Nov 2019	-		0.747	0.000	1.372	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4032 / *A2AD*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
A2AD Test & Evaluation	SS/CPFF	Raytheon : Tucson, AZ	0.000	0.000		0.525	Dec 2018	0.000		-		0.000	0.000	0.525	-
		Subtotal	0.000	0.000		1.150		0.747		-		0.747	0.000	1.897	N/A

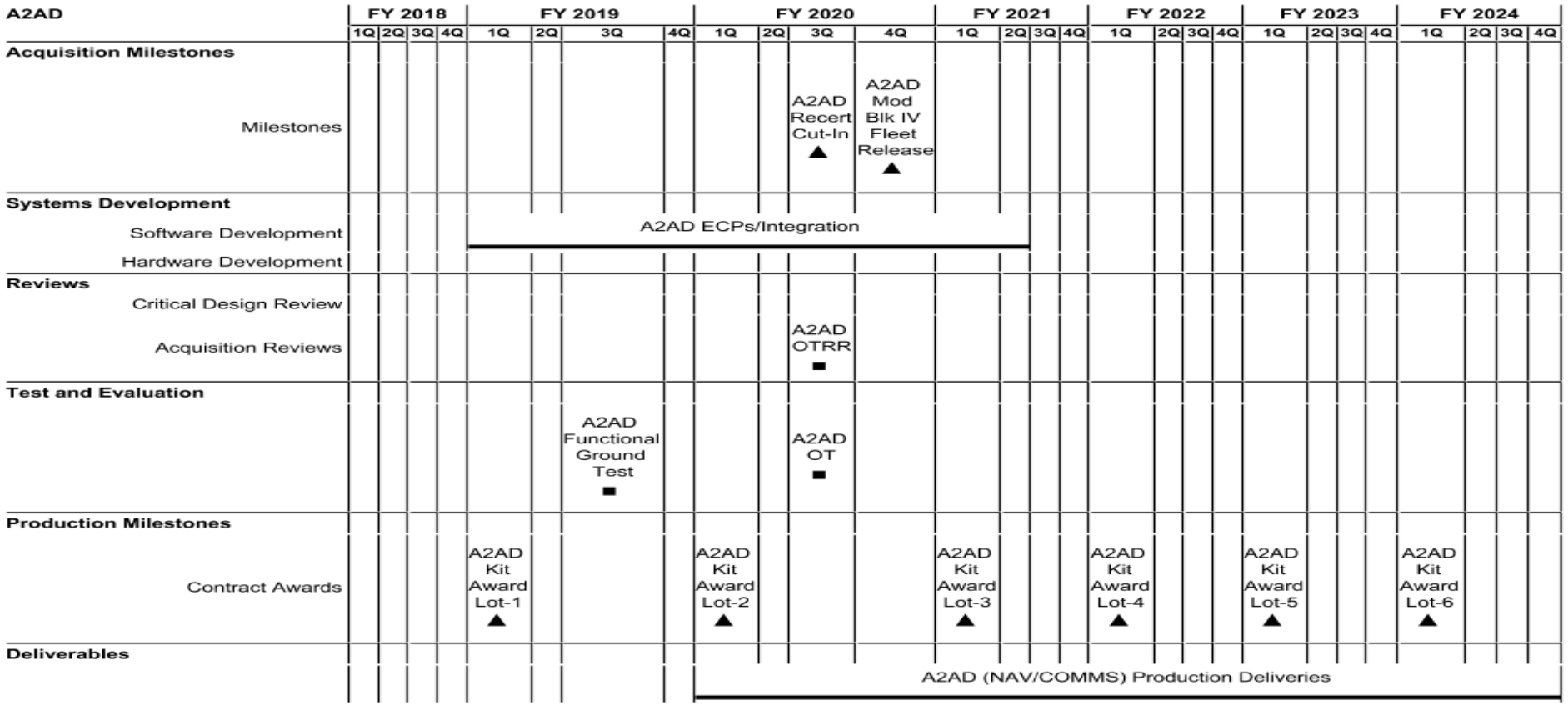
Remarks

FY 2020 A2AD Test and Evaluation funding required for flight test and associated procedures.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		4.835		4.144		-		4.144	0.000	8.979	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4032 / *A2AD*



2020PB - 0204229N - 4032

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4032 / *A2AD*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
A2AD				
Acquisition Milestones: Milestones: A2AD Recert Cut-In	3	2020	3	2020
Acquisition Milestones: Milestones: A2AD Modernization Blk IV Fleet Release	4	2020	4	2020
Systems Development: Software Development: A2AD Navigation/Communications ECPs/Integration	1	2019	2	2021
Reviews: Acquisition Reviews: A2AD - OTRR	3	2020	3	2020
Test and Evaluation: A2AD Functional Ground Test	3	2019	3	2019
Test and Evaluation: A2AD Operational Test	3	2020	3	2020
Production Milestones: Contract Awards: A2AD Kit Award Lot-1	1	2019	1	2019
Production Milestones: Contract Awards: A2AD Kit Award Lot-2	1	2020	1	2020
Production Milestones: Contract Awards: A2AD Kit Award Lot-3	1	2021	1	2021
Production Milestones: Contract Awards: A2AD Kit Award Lot-4	1	2022	1	2022
Production Milestones: Contract Awards: A2AD Kit Award Lot-5	1	2023	1	2023
Production Milestones: Contract Awards: A2AD Kit Award Lot-6	1	2024	1	2024
Deliverables: A2AD (NAV/COMMS) Production Deliveries	1	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4033 / *M-Code*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
4033: *M-Code*	0.000	0.000	21.760	28.912	-	28.912	14.569	3.964	12.800	3.672	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The M-Code ACAT IVT program upgrades the Tactical Tomahawk to the next generation Global Positioning System (GPS) satellite constellation required to maintain GPS-provided position, navigation, and timing (PNT) for the missiles and is estimated to be available for operations in FY 2024. The M-code mandate and Public Law restrict the purchase of only M-code-capable GPS User Equipment (MGUE) after FY 2017 unless a waiver is granted by the Secretary of Defense.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: M-Code	0.000	21.760	28.912	0.000	28.912
Articles:	-	-	-	-	-
FY 2019 Plans: Military-Code (M-Code) planned activities include completing Milestone B to enter the Engineering Manufacturing and Development (EMD) phase. EMD efforts include design, development, and integration of the Application Specific Integrated Circuit (ASIC) chip.					
FY 2020 Base Plans: M-Code planned activities include continuation of EMD efforts, completion of Preliminary Design Review (PDR), and Critical Design Review (CDR). EMD efforts include of hardware and software development, design, development, integrate, and test the integrated ASIC chip into the upgraded Tactical Tomahawk (TACTOM) Anti-Jam Receiver (AGR5).					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The increase from FY2019 to FY2020 of $7.152M is due to EMD efforts required for the addition of hardware and software development to mature the design to meet PDR and CDR.					
Accomplishments/Planned Programs Subtotals	0.000	21.760	28.912	0.000	28.912

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4033 / *M-Code*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN 2101: *Tomahawk*	187.354	98.570	386.730	-	386.730	373.963	220.141	317.815	280.825	1,438.643	16,756.166
• OPN 5253: *Tomahawk Support Equipment*	73.184	86.045	78.593	-	78.593	95.438	108.493	86.741	85.304	Continuing	Continuing
• OPN 9020: *Initial and Vendor Direct Spares*	0.311	0.365	0.095	-	0.095	0.180	0.199	0.219	0.223	Continuing	Continuing
• WPN 6120: *Spares and Repair Parts*	13.518	25.096	23.801	-	23.801	19.575	18.707	22.499	22.949	Continuing	Continuing

Remarks

D. Acquisition Strategy

The M-Code (ACAT IV) acquisition strategy includes the development, integration, test, qualification and production of a new GPS receiver which will satisfy Public Law 111-383, sec 913 compliance. M-Code capability enables the missile to maintain GPS integrity in an enhanced spoofing environment. M-Code Milestone B will occur in FY 2019, Milestone C is planned for FY 2023, and the capability will Fleet Release in FY 2025. The M-Code program includes upgrades to the All-Up Round (AUR) missile, Tactical Tomahawk Weapons Control System (TTWCS) and Theater Mission Planning Center (TMPC).

E. Performance Metrics

The Navy seeks to improve the Tomahawk cruise missile attack capability against land and maritime targets through research and development.

Examples in the area of the All-Up-Round include development of a high anti-jam GPS receiver in line with state of the art technology.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4033 / *M-Code*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M-Code-AUR	C/CPFF	Raytheon : Tuscon, AZ	0.000	0.000		6.478	Dec 2018	22.086	Dec 2019	-		22.086	Continuing	Continuing	Continuing
M-Code - AUR	SS/FFP	Raytheon : Raytheon, AZ/SAS:	0.000	0.000		9.345	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing
M-Code - TTWCS	SS/CPFF	LMVF : Valley Forge, PA	0.000	0.000		0.239	Nov 2018	0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
M-Code - TTWCS	SS/CPFF	LMBM : Baltimore, MD	0.000	0.000		0.371	Nov 2018	0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
M-Code - TTWCS	SS/CPFF	BAE Systems : San Diego, CA	0.000	0.000		0.065	Apr 2019	0.065	Dec 2019	-		0.065	0.000	0.130	-
		Subtotal	0.000	0.000		16.498		23.151		-		23.151	Continuing	Continuing	N/A

Remarks

FY 2020 M-Code product development funding required to commence the Engineering and Manufacturing Development phase while continuing design & certification of the Application Specific Integrated Circuit (ASIC) chip; fabrication, integration, testing and evaluation (IT&E) of the ASIC chip into the upgraded Anti-jam GPS Receiver (AGR-5); beginning stages of IT&E of the AGR-5 into subsystem components and the AUR missile.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M-Code Development Support	WR	NAWC-WD : China Lake, CA	0.000	0.000		0.146	Dec 2018	0.275	Nov 2019	-		0.275	Continuing	Continuing	Continuing
M-Code Development Support	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.552	Nov 2018	1.360	Nov 2019	-		1.360	0.000	1.912	-
M-Code Development Support	WR	NUWC-NPT : Newport, RI	0.000	0.000		0.500	Nov 2018	0.500	Nov 2019	-		0.500	0.000	1.000	-
M-Code Development Support	WR	NSWC-IH : Indian Head, MD	0.000	0.000		0.644	Nov 2018	0.650	Nov 2019	-		0.650	Continuing	Continuing	Continuing
M-Code Development Support	SS/CPFF	UARC APL : Laurel, MD	0.000	0.000		1.727	Nov 2018	0.960	Nov 2019	-		0.960	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4033 / *M-Code*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M-Code/TTWCS Development Spt	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.990	Nov 2018	0.520	Dec 2019	-		0.520	Continuing	Continuing	Continuing
M-Code/TTWCS VLS Development Spt	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.000		0.300	Dec 2019	-		0.300	0.000	0.300	-
M-Code Development Support	SS/CPFF	Various : Various	0.000	0.000		0.075	Dec 2018	0.000		-		0.000	0.000	0.075	-
		Subtotal	0.000	0.000		4.634		4.565		-		4.565	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M-Code Test & Evaluation	WR	NAWC-AD : Patuxent River	0.000	0.000		0.000		0.656	Nov 2019	-		0.656	Continuing	Continuing	Continuing
M-Code/TTWCS Test & Evaluation	WR	NUWC-NPT : Newport, RI	0.000	0.000		0.000		0.290	Nov 2019	-		0.290	0.000	0.290	-
M-Code Test & Evaluation	WR	NSWCIH : Indian Head, MD	0.000	0.000		0.553	Nov 2018	0.000		-		0.000	0.000	0.553	-
		Subtotal	0.000	0.000		0.553		0.946		-		0.946	Continuing	Continuing	N/A

Remarks

FY 2020 M-Code Test and Evaluation will encompass modeling and simulation of the AGR-5 in navigation simulators designed to simulate real-world M-Code, Y-Code, and jamming environments. Test vectors will be designed, developed, and finalized to guide the M&S testing events

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M-Code	WR	NAWC-AD : Patuxent River	0.000	0.000		0.075	Nov 2018	0.250	Nov 2019	-		0.250	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.075		0.250		-		0.250	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4033 / *M-Code*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		21.760		28.912		-		28.912	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4033 / *M-Code*

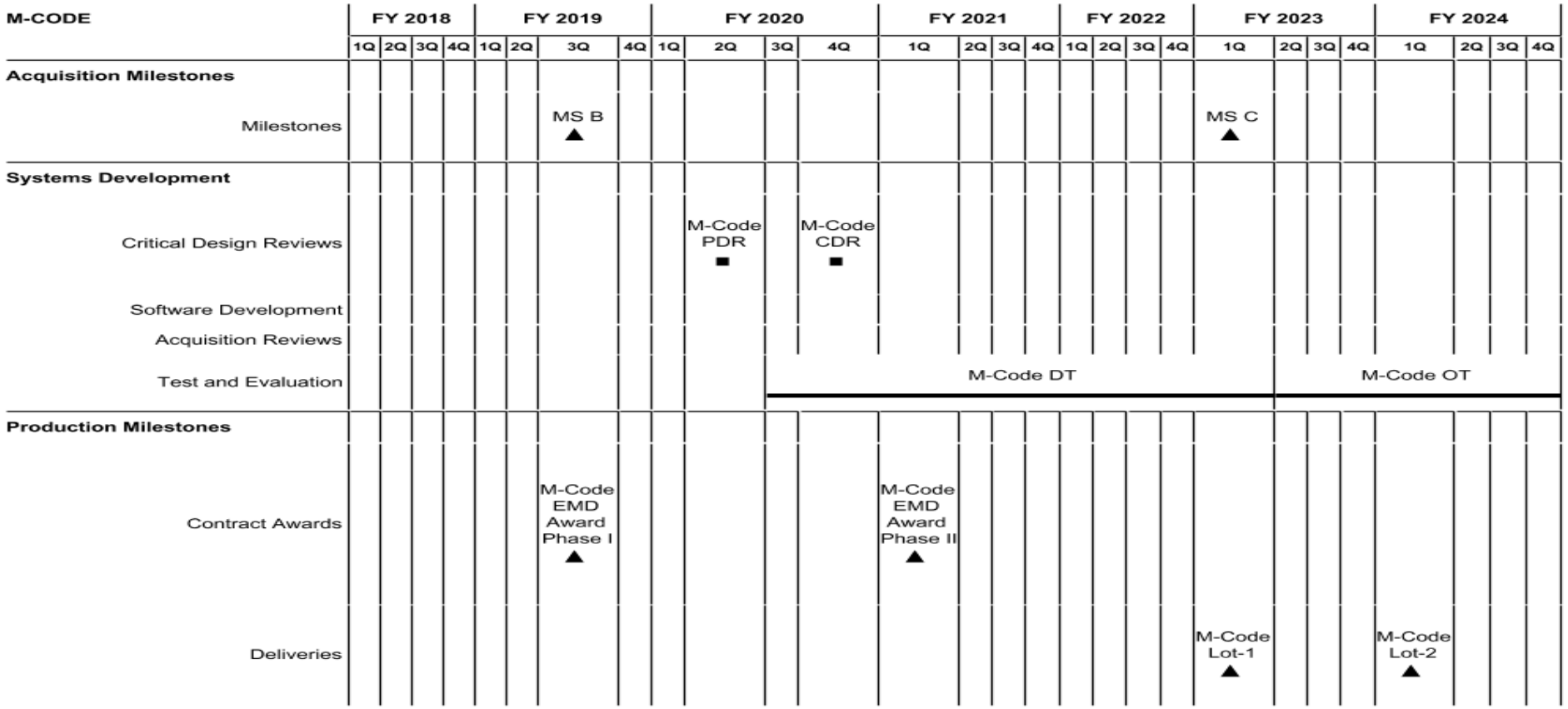


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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4033 / *M-Code*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
M-CODE				
Acquisition Milestones: Milestones: Milestone B	3	2019	3	2019
Acquisition Milestones: Milestones: Milestone C	1	2023	1	2023
Systems Development: Critical Design Reviews: M-Code PDR	2	2020	2	2020
Systems Development: Critical Design Reviews: M-Code CDR	4	2020	4	2020
Systems Development: Test and Evaluation: M-Code Development Test Build One & Development Test Build Two	3	2020	1	2023
Systems Development: Test and Evaluation: M-Code Operational Test	2	2023	4	2024
Production Milestones: Contract Awards: M-Code EMD Award Phase I	3	2019	3	2019
Production Milestones: Contract Awards: M-Code EMD Award Phase II	1	2021	1	2021
Production Milestones: Deliveries: M-Code Lot-1	1	2023	1	2023
Production Milestones: Deliveries: M-Code Lot-2	1	2024	1	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4034 / *Maritime Strike*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
4034: *Maritime Strike*	0.000	0.000	185.380	227.854	-	227.854	125.138	71.925	0.000	0.000	0.000	610.297
Quantity of RDT&E Articles		-	18	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Maritime Strike Tomahawk modernization effort provides the capability to hit moving maritime targets through mid-course guidance via a third party or seeker mode, to a terminal seeker area of uncertainty.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Maritime Strike Tomahawk	0.000	185.380	227.854	0.000	227.854
Articles:	-	18	-	-	-
FY 2019 Plans: Continuation of activities in support of Maritime Strike Tomahawk (MST). Effort includes development of system requirements, specifications, and interfaces; integration of seeker suites, culminating in a mature hardware design with software algorithm preliminary design architecture. Continue Tactical Tomahawk Weapons Control System (TTWCS), Theater Mission Planning Center (TMPC), and missile software development; captive carriage flights and sensor capture events, and lab and component-level testing. Award contract for integration and test. Commence integration and testing of mature hardware design with software functionality qualification of hardware and software, missile Operationally Embedded Software (OES) software development, laboratory development of Modeling and Simulation capabilities in the lab for missile performance and algorithm maturity, and simulation updates. In addition, procure (18) Engineering Development Models (EDMs) for the purpose of parallel testing and reducing risk while allowing for procurement of hardware components required to build kits for full system end to end testing in FY 2020.					
FY 2020 Base Plans: Continuation of activities in support of Maritime Strike Tomahawk (MST). Effort includes integration of seeker suites and mature software algorithm code. Software functionality qualification; establish validation and verification procedures through data collection. Missile OES software development continues, laboratory development of Modeling and Simulation capabilities in the lab for missile performance and algorithm maturity; simulation updates. Develop interfaces through SPAWAR to support data quality infrastructure. Build-up of Trailblazer Engineering Development Model for Functional Ground test and design verification test parameters. Hardware qualification of system and subsystems/components. Early developmental captive					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4034 / *Maritime Strike*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
flight tests and simulations to refine software algorithm performance. Establish Hardware-in-the-Loop (HWIL) capability and associated test and support equipment. Refine Modeling and Simulation capability through software performance enhancements. Continue TTWCS and missile software development. Continue development of logistics, training, and installation products. Develop and conduct transition to production requirements, telemeter products, develop kitting requirements and containers. Begin development of procedures for induction to recertification line, acceptance test procedures, and automated test equipment. Commence end to end system testing. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase is due to the acceleration of seeker integration and software design and coding efforts in FY 2020. These efforts include ground launches, flight test readiness review, earlier ground launches, earlier hardware qualification of system and subsystems / components, earlier Flight Software Build 1, and earlier System of System Testing (Modeling and Simulation) supporting ground launch and sensor test runs that refine sensor software algorithm performance. These accelerated activities support an Initial Operational Capability (IOC) of 4Q FY 2022.					
Accomplishments/Planned Programs Subtotals	0.000	185.380	227.854	0.000	227.854

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN 2101: *Tomahawk*	187.354	98.570	386.730	-	386.730	373.963	220.141	317.815	280.825	1,438.643	16,756.166
• OPN 5253: *Tomahawk Support Equipment*	73.184	86.045	78.593	-	78.593	95.438	108.493	86.741	85.304	Continuing	Continuing
• OPN 9120: *Initial and Vendor Direct Spares*	0.311	0.365	0.095	-	0.095	0.180	0.199	0.219	0.223	Continuing	Continuing
• WPN 6120: *Spares and Repair Parts*	13.518	25.096	23.801	-	23.801	19.575	18.707	22.499	22.949	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4034 / *Maritime Strike*

D. Acquisition Strategy

Maritime Strike Tomahawk (MST) will enable surface warfare engagement capability from U.S. Navy Guided Missile Cruiser (CG), Guided Missile Destroyer (DDG), and Nuclear Powered Fast Attack Submarine (SSN) platforms. MST was designated a DoDI 5000.02 Rapid Deployment Capability (RDC) by the Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN (RDA)) in Oct 2016. Initial Operational Capability (IOC) will occur in FY 2022 following a Quick Reaction Assessment (QRA) and characterization of operational performance. This strategy affords the program flexibility in achieving a threshold capability in a timely manner. Following IOC, further procurements will comply with DoDI 5000.02 as a program of record. The MST program includes upgrades to the All-Up Round (AUR) missile, Tactical Tomahawk Weapons Control System (TTWCS) and Theater Mission Planning Center (TMPC).

E. Performance Metrics

The Navy seeks to improve the Tomahawk cruise missile attack capability against maritime targets through research and development.

Examples in the area of the All-Up-Round include development of a seeker that will enhance weapon ability to cover all assigned target types in line with state of the art technology.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4034 / *Maritime Strike*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Maritime Strike - AUR	SS/CPIF	Raytheon : Tucson, AZ	0.000	0.000		124.175	Dec 2018	183.688	Dec 2019	-		183.688	0.000	307.863	-
Maritime Strike - AUR	WR	NAWCWD : China Lake, CA	0.000	0.000		20.330	Nov 2018	9.500	Nov 2019	-		9.500	0.000	29.830	-
Maritime Strike- TTWCS	SS/CPFF	LMVF : Valley Forge, PA	0.000	0.000		9.090	Dec 2018	0.750	Dec 2019	-		0.750	0.000	9.840	-
Maritime Strike- TTWCS	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		6.250	Nov 2018	6.250	Nov 2019	-		6.250	0.000	12.500	-
Maritime Strike- TTWCS	WR	NUWC-DN : Newport, RI	0.000	0.000		1.060	Nov 2018	0.750	Nov 2019	-		0.750	0.000	1.810	-
		Subtotal	0.000	0.000		160.905		200.938		-		200.938	0.000	361.843	N/A

Remarks

FY 2020 Maritime Strike funding includes the integration of seeker suites and mature software algorithm code. The procurement of developmental low rate production assets. Develop and conduct transition to production requirements, telemeter products, develop kitting requirements and containers. Begin development of procedures for induction to recertification line, acceptance test
procedures, and automated test equipment.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Maritime Strike Development Support	WR	NAWC-WD : China Lake	0.000	0.000		3.400	Nov 2018	3.461	Nov 2019	-		3.461	0.000	6.861	-
Martime Strike Development Support	SS/CPFF	UARC APL : Laurel, MD	0.000	0.000		0.521	Dec 2018	0.530	Dec 2019	-		0.530	0.000	1.051	-
Maritime Strike Development Support	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.500	Nov 2018	0.835	Nov 2019	-		0.835	0.000	1.335	-
Maritime Strike Development Support	WR	NAWC-AD : Pax River, MD	0.000	0.000		1.910	Nov 2018	2.500	Nov 2019	-		2.500	0.000	4.410	-
Maritime Strike Development Support	WR	NSWC-PHD : Port Hueneme, CA	0.000	0.000		1.580	Nov 2018	1.608	Nov 2019	-		1.608	0.000	3.188	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4034 / *Maritime Strike*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Maritime Strike Development Support	C/CPFF	SSC : San Diego, CA	0.000	0.000		3.920	Dec 2018	0.750	Dec 2019	-		0.750	0.000	4.670	-
Maritime Strike Development Support	WR	SPAWAR : San Diego, CA	0.000	0.000		2.980	Dec 2018	3.000	Dec 2019	-		3.000	0.000	5.980	-
Maritime Strike Development Support	C/FFP	TBD : Dahlgren, VA	0.000	0.000		2.105	Dec 2018	2.143	Dec 2019	-		2.143	0.000	4.248	-
Maritime Strike Development Support	C/CPFF	TBD : Newport, RI	0.000	0.000		0.383	Dec 2018	0.385	Dec 2019	-		0.385	0.000	0.768	-
Maritime Strike Development Support	Various	Various : Various	0.000	0.000		2.952	Dec 2018	3.005	Dec 2019	-		3.005	0.000	5.957	-
		Subtotal	0.000	0.000		20.251		18.217		-		18.217	0.000	38.468	N/A

Remarks

Decrease from FY19 to FY20 due to reduction in Contractor Support Services

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Maritime Strike Test and Evaluation	WR	NAWC-WD : China Lake	0.000	0.000		3.133	Nov 2018	6.449	Nov 2019	-		6.449	0.000	9.582	-
Maritime Strike Test and Evaluation	WR	NAWC-AD : Pax River	0.000	0.000		0.841	Nov 2018	1.500	Nov 2019	-		1.500	0.000	2.341	-
Maritime Strike Test and Evaluation	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.250	Nov 2018	0.750	Nov 2019	-		0.750	0.000	1.000	-
		Subtotal	0.000	0.000		4.224		8.699		-		8.699	0.000	12.923	N/A

Remarks

FY 2020 Test and Evaluation Maritime Strike funding required to develop Operationally Embedded Software (OES) development Build-up of Trailblazer Engineering Development Model for Functional Ground test and design verification test parameters. Hardware qualification of the seeker suite. Early developmental captive flight tests and simulations to refine software algorithm performance. Establish HWIL capability and associated test and support equipment. Continue TTWCS and missile software development.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4034 / *Maritime Strike*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		185.380		227.854		-		227.854	0.000	413.234	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4034 / *Maritime Strike*

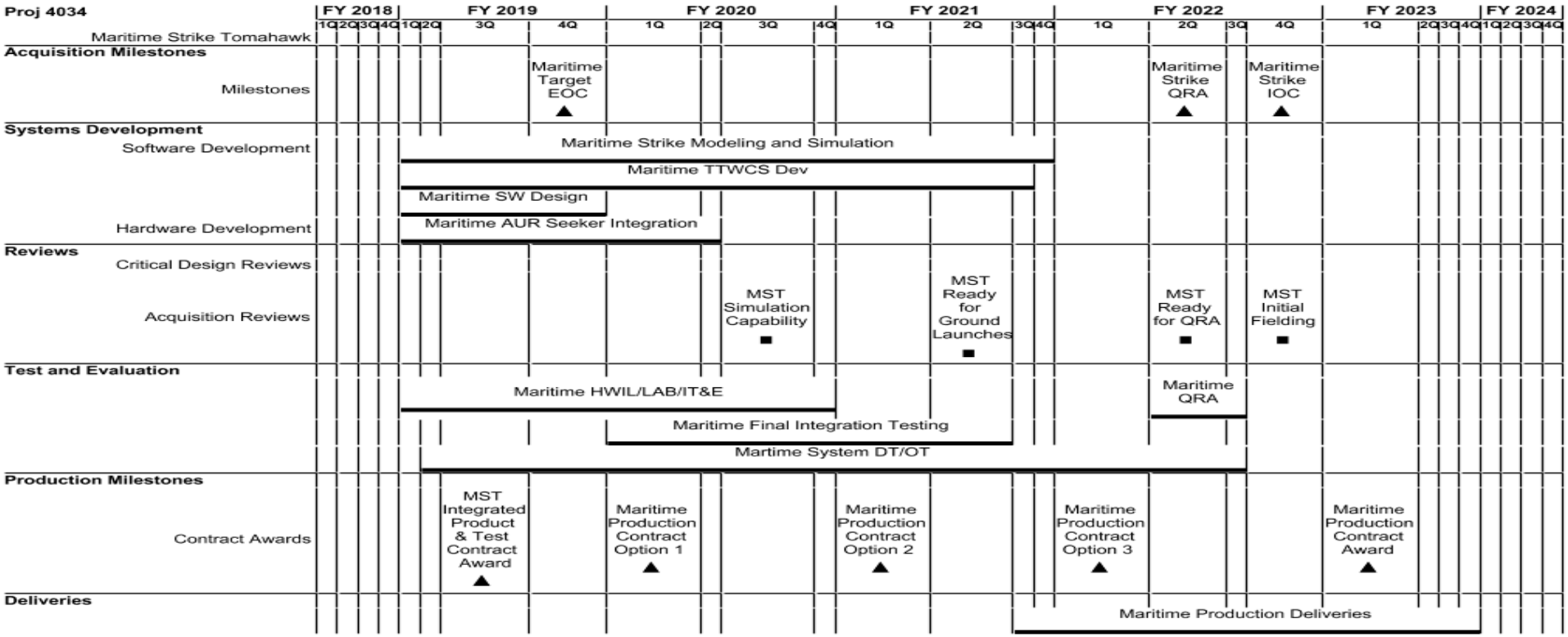

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4034 / *Maritime Strike*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 4034				
Acquisition Milestones: Milestones: Maritime Target Capability Early Operational Capability	4	2019	4	2019
Acquisition Milestones: Milestones: Maritime Strike Initial Operational Capability	4	2022	4	2022
Acquisition Milestones: Milestones: Maritime Strike QRA	2	2022	2	2022
Systems Development: Software Development: Maritime Strike Modeling and Simulation	1	2019	4	2021
Systems Development: Software Development: Maritime Strike- TTWCS Development	1	2019	3	2021
Systems Development: Software Development: Maritime Strike Software Design	1	2019	4	2019
Systems Development: Hardware Development: Maritime Strike - AUR Seeker Integration	1	2019	2	2020
Reviews: Acquisition Reviews: Maritime Strike Simulation Capability	3	2020	3	2020
Reviews: Acquisition Reviews: Maritime Strike Ready for Ground Launches	2	2021	2	2021
Reviews: Acquisition Reviews: Maritime Strike Ready for QRA	2	2022	2	2022
Reviews: Acquisition Reviews: Maritime Strike Initial Fielding	4	2022	4	2022
Test and Evaluation: Maritime Strike - HWIL/LAB/Integration Testing	1	2019	4	2020
Test and Evaluation: Maritime Strike QRA	2	2022	3	2022
Test and Evaluation: Maritime Strike Final Integration Testing	1	2020	2	2021
Test and Evaluation: Maritime Strike Testing	2	2019	3	2022
Production Milestones: Contract Awards: MST Integrated Product & Test Contract Award	3	2019	3	2019
Production Milestones: Contract Awards: Maritime Strike Production Contract Award LRIP-1	1	2020	1	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4034 / *Maritime Strike*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: Contract Awards: Maritime Strike Production Contract Award LRIP-2	1	2021	1	2021
Production Milestones: Contract Awards: Maritime Strike Production Contract Award LRIP-3	1	2022	1	2022
Production Milestones: Contract Awards: Maritime Strike Production Contract Award	1	2023	1	2023
Deliveries: Maritime Strike Production Deliveries	3	2021	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4035 / *JMEWS*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
4035: *JMEWS*	0.000	0.000	17.031	41.226	-	41.226	45.543	37.021	21.487	31.298	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Multiple-Effects Warhead System (JMEWS) ACAT III program enables the Tactical Tomahawk to utilize multiple lethal effects to address Hard and Deeply Buried Targets (HDBT) while increasing the Tomahawk Weapon System (TWS) capabilities against Integrated Air Defense Systems (IADS) and Weapons of Mass Destruction (WMD).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: JMEWS	0.000	17.031	41.226	0.000	41.226
Articles:	-	-	-	-	-
FY 2019 Plans: JMEWS planned activities include completion of the fuze risk reduction efforts, and completing Milestone B to enter the Engineering and Manufacturing Development phase. Fuze risk reduction will culminate in sled testing. Initial Engineering and Manufacturing Design (EMD) efforts include continuation of hardware and software development, performing fuze and warhead integration, performing subscale testing required to improve lethality modeling capabilities, and system engineering reviews. Update Tomahawk Test and Evaluation Master Plan.					
FY 2020 Base Plans: JMEWS planned activities include the Engineering and Manufacturing Development phase. Initial Engineering and Manufacturing Design (EMD) efforts include continuation of hardware and software development, performing fuze and warhead integration, performing subscale testing required to improve lethality modeling capabilities, system engineering reviews and several Safety Review Boards.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 to FY 2020 increase due to transition of the program into the Engineering Manufacturing and Development Phase.					
Accomplishments/Planned Programs Subtotals	0.000	17.031	41.226	0.000	41.226

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4035 / *JMEWS*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN 2101: *Tomahawk*	187.354	98.570	386.730	-	386.730	373.963	220.141	317.815	280.825	1,438.643	16,756.166
• OPN 5253: *Tomahawk Support Equipment*	73.184	86.045	78.593	-	78.593	95.438	108.493	86.741	85.304	Continuing	Continuing
• OPN 9020: *Initial and Vendor Direct Spares*	0.311	0.365	0.095	-	0.095	0.180	0.199	0.219	0.223	Continuing	Continuing
• WPN 6120: *Spares and Repair Parts*	13.518	25.096	23.801	-	23.801	19.575	18.707	22.499	22.949	Continuing	Continuing

Remarks

D. Acquisition Strategy

Joint Multiple Effects Warhead System (JMEWS) (ACAT III) acquisition strategy includes the development, integration, test, qualification and production of a new warhead that will greatly expand the land target set that the Tomahawk missile is capable of defeating, by combining the blast and fragmentation capabilities of the current warhead with a new penetration capability and improved mission planning. JMEWS will also be compliant with Insensitive Munitions requirements which improve safety during transportation and storage on land and aboard ships and submarines. JMEWS Milestone B will occur in FY 20129, Milestone C is planned for FY 2024, and the capability will Fleet Release in FY2025. JMEWS program includes upgrades to the All-Up Round (AUR) missile, Tactical Tomahawk Weapons Control System (TTWCS) and Theater Mission Planning Center (TMPC).

E. Performance Metrics

The Navy seeks to improve the Tomahawk cruise missile attack capability against land targets through research and development.

Examples in the area of the All-Up-Round include development of candidate warheads that will enhance weapon ability to cover all assigned target types in line with state of the art technology.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4035 / *JMEWS*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JMEWS	SS/CPFF	Raytheon : Tucson, AZ	0.000	0.000		1.680	Dec 2018	27.914	Jul 2020	-		27.914	Continuing	Continuing	Continuing
JMEWS	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.587	Nov 2018	0.000		-		0.000	Continuing	Continuing	Continuing
JMEWS	WR	NAWC-WD : China Lake, CA	0.000	0.000		8.876	Nov 2018	0.000		-		0.000	Continuing	Continuing	Continuing
JMEWS/TTWCS	SS/CPFF	LMVF : Valley Forge, PA	0.000	0.000		0.000		0.550	Dec 2019	-		0.550	0.000	0.550	-
JMEWS/TTWCS	SS/CPFF	BAE Systems : San Diego, CA	0.000	0.000		0.000		0.065	Dec 2019	-		0.065	0.000	0.065	-
JMEWS/TTWCS	SS/CPFF	LMBM : Baltimore, MD	0.000	0.000		0.000		0.685	Dec 2019	-		0.685	0.000	0.685	-
		Subtotal	0.000	0.000		11.143		29.214		-		29.214	Continuing	Continuing	N/A

Remarks

FY 2020 JMEWS product development efforts include hardware and software development, performing fuze and warhead integration, performing subscale testing required to improve lethality modeling capabilities, system engineering reviews and several Safety Review Boards.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JMEWS Development Support	SS/CPFF	UARC-APL : Laurel, MD	0.000	0.000		0.105	Nov 2018	0.337	Dec 2019	-		0.337	Continuing	Continuing	Continuing
JMEWS Development Support	WR	NSWC-IH : Indian Head, MD	0.000	0.000		0.256	Nov 2018	0.274	Nov 2019	-		0.274	Continuing	Continuing	Continuing
JMEWS Development Support	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.376	Nov 2018	0.900	Nov 2019	-		0.900	Continuing	Continuing	Continuing
JMEWS Development Support	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.000		1.500	Nov 2019	-		1.500	0.000	1.500	-
JMEWS Development Support	WR	NAWC-WD : China Lake, CA	0.000	0.000		0.149	Nov 2018	4.197	Nov 2019	-		4.197	0.000	4.346	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4035 / *JMEWS*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JMEWS/TTWCS Dev Support	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.000		0.735	Dec 2019	-		0.735	0.000	0.735	-
JMEWS/TTWCS VLS Dev Support	SS/CPFF	NSWC-DD : Dahlgren, VA	0.000	0.000		0.112	Dec 2018	0.960	Dec 2019	-		0.960	0.000	1.072	-
JMEWS Development Support	Various	Various : Various	0.000	0.000		0.160	Dec 2018	0.163	Dec 2019	-		0.163	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		1.158		9.066		-		9.066	Continuing	Continuing	N/A

Remarks

FY 2020 JMEWS Development Support funds government oversight efforts of the transition to the Engineering and Manufacturing Development phase, including conduct of scheduled technical reviews.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JMEWS T&E	WR	NAWC-WD : China Lake, CA	0.000	0.000		4.730	Nov 2018	1.705	Nov 2019	-		1.705	0.000	6.435	-
JMEWS T&E	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.000		0.656	Nov 2019	-		0.656	0.000	0.656	-
JMEWS/TTWCS T&E	WR	NUWC-NPT : Newport, RI	0.000	0.000		0.000		0.335	Nov 2019	-		0.335	0.000	0.335	-
		Subtotal	0.000	0.000		4.730		2.696		-		2.696	0.000	7.426	N/A

Remarks

FY 2020 JMEWS testing will include performing subscale testing required to improve lethality modeling capabilities, system engineering reviews and several Safety Review Boards.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4035 / *JMEWS*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JMEWS	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.000		0.250	Nov 2019	-		0.250	0.000	0.250	-
		Subtotal	0.000	0.000		0.000		0.250		-		0.250	0.000	0.250	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		17.031		41.226		-		41.226	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4035 / *JMEWS*

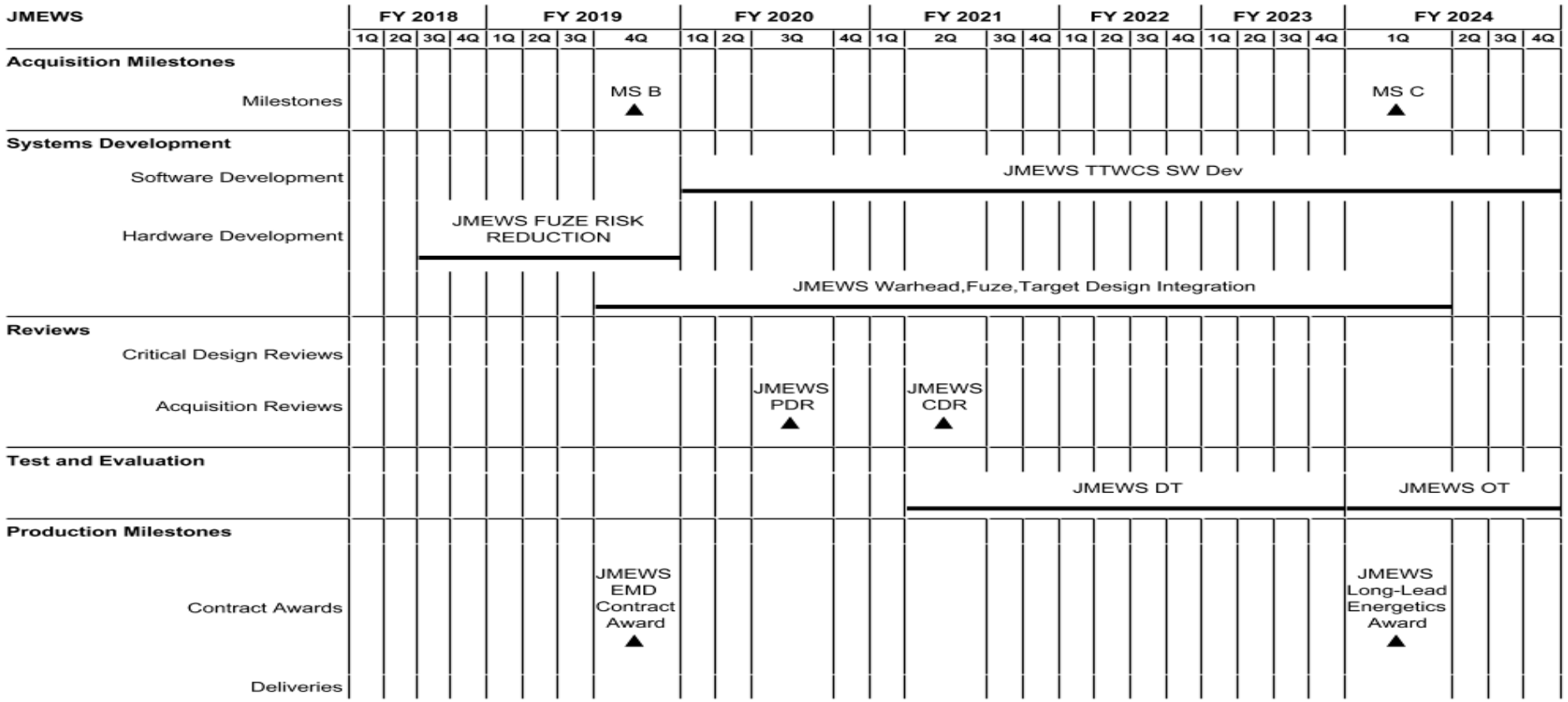

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4035 / *JMEWS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
JMEWS				
Acquisition Milestones: Milestones: Milestone B	4	2019	4	2019
Acquisition Milestones: Milestones: Milestone C	1	2024	1	2024
Systems Development: Software Development: JMEWS TTWCS SW Dev	1	2020	4	2024
Systems Development: Hardware Development: JMEWS FUZE RISK REDUCTION	3	2018	4	2019
Systems Development: Hardware Development: JMEWS Warhead,Fuze,Target Design Integration	4	2019	1	2024
Reviews: Acquisition Reviews: JMEWS PDR	3	2020	3	2020
Reviews: Acquisition Reviews: JMEWS CDR	2	2021	2	2021
Test and Evaluation: JMEWS DT	2	2021	4	2023
Test and Evaluation: JMEWS OT	1	2024	4	2024
Production Milestones: Contract Awards: JMEWS EMD Contract Award	4	2019	4	2019
Production Milestones: Contract Awards: JMEWS Long-Lead Energetics Award	1	2024	1	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4036 / *TTWCS TMPC PPPI*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
4036: *TTWCS TMPC PPPI*	0.000	0.000	23.389	17.998	-	17.998	14.000	10.165	17.868	18.226	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Theater Mission Planning Center (TMPC) consists of Commercial and Government Off-The-Shelf (COTS/GOTS) software and COTS hardware. TMPC is the mission planning segment of the Tomahawk Weapon System (TWS) that provides subsystems for the precision targeting, route planning, mission distribution, and strike management of Tomahawk cruise missile missions from sites located ashore and afloat. TMPC optimizes all aspects of the Tomahawk missile mission to successfully engage a target.

TMPC provides mission planning at the theater and operational levels and is designed for high rate mission planning production responsive to national strategic, operational, and tactical requirements. TMPC develops and distributes missions; provides command information services for all variants of the Tomahawk missile; provides strike planning, execution, coordination, control and reporting, and provides Maritime Component Commanders (MCC) the capability to plan or modify conventional TWS missions. TMPC is employed in major joint combat operations and Overseas Contingency Operations. TMPC has evolved into 4 scalable configurations deployed at 189 sites: Cruise Missile Support Activities (CMSAs) (3), Tomahawk Strike Mission Planning Cells (TSMPCs) (3), Carrier Strike Groups (CSGs) (19 - 10 CVN), and Firing Units (FRUs) (145 - 88 Surface / 57 Subsurface). Additionally, TMPC is installed in Labs (6) and Training Classrooms (13) that contain various combinations of the four configurations. TMPC software development activities support new capabilities for the Tomahawk Weapon System while also decreasing mission planning time, increasing the quality and accuracy of each mission and reducing complexity. TMPC was previously referred to as Tomahawk Command and Control System (TC2S).

The Tactical Tomahawk Weapons Control System (TTWCS) provides launch capability for surface and submarine platforms. Development of the TTWCS provides a common architecture to launch the TACTOM and all variants in inventory. Development of upgrades to the TTWCS is required to meet the Department of Defense Information Technology Standards Registry, to meet FORCEnet compliance and be Internet Protocol Version 6 ready in order to remain interoperable within the Joint Service Architecture and to retain weapons system viability and usability for our Sailors. Additionally, TTWCS provides launch capability for both types of modernization efforts, A2AD (Nav/Comms) and Maritime, through an incremental approach to software and hardware upgrades. These efforts provide battle-group tactical flexibility and responsiveness while maximizing TWS wartime capability.

Pre-Planned Product Improvement (P3I) funding is required to create an integrated future strategy across the Tomahawk Weapon System. This includes identifying potential capability upgrades, advanced technologies, and new requirements resulting from target and lethality assessments, engine performance analysis, data-fusion studies, campaign planning, mission analysis, fleet experimentation and kill chain analysis. Perform nonrecurring engineering activities, systems and software development, integration and testing of capability upgrades to address emergent threats, Urgent Operational Needs (UONS), fleet gaps, and the Tomahawk Operational Readiness Document (ORD).

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4036 / *TTWCS TMPC PPPI*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Theater Mission Planning Center (TMPC)	0.000	20.664	16.407	0.000	16.407
Articles:	-	-	-	-	-
FY 2019 Plans: Continue TWS navigation and accuracy and weapons delivery Circular Error Probable (CEP) studies and assessments necessary to ensure the TWS is properly employed; continued evaluation of TMPC design process to ensure Tomahawk missile performance characteristics are adequately modeled in TMPC; and continue evaluation of imagery formats resulting from nationally mandated architectural and format changes. Conduct A2AD navigation and communications system product acceptance testing (PAT) at the TWS level required to support the TWS Modernization program. Conduct software development and start system integration and testing of Maritime Strike Tomahawk capability. Conduct requirements definition for the TWS GPS M-Code upgrade necessary to enhance TWS GPS navigation and guidance. Conduct requirements definition and preliminary design to support TWS Joint Multiple Effects Warhead System (JMEWS) transition, demonstration and test efforts.					
FY 2020 Base Plans: Continue evaluation of TMPC design process to ensure Tomahawk missile performance characteristics are adequately modeled in TMPC. Complete A2AD navigation and communications system testing at the TWS level required to support the TWS Modernization program. Continue coding of Maritime Strike Tomahawk capability. Complete requirements definition and preliminary design to support TWS Joint Multiple Effects Warhead System (JMEWS) transition, demonstration and test efforts.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 to FY 2020 decrease of 4.3 million is the result of completing the majority of software development and systems integration and testing of the Maritime Strike Tomahawk capability in FY 2019 prior to commencing Product Acceptance Testing (PAT) in FY 2020.					
Title: Tactical Tomahawk Weapons Control System (TTWCS)	0.000	2.725	1.591	0.000	1.591
Articles:	-	-	-	-	-
FY 2019 Plans: Continue TTWCS software development efforts necessary to enable Tomahawk navigation and communications modernization. Conduct integration and functional testing for TTWCS v5.6 which includes A2AD navigation and					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4036 / *TTWCS TMPC PPPI*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
modernization improvements. Correct and verify software deficiencies found in segment testing and develop final software "fix-it" build for system level test events. Continue TTWCS ship test, ship certifications and prepare for operational test events. Perform nonrecurring engineering activities, systems and software development, integration and testing of capability upgrades to address emergent threats, Urgent Operational Needs (UONS), fleet gaps, and the Tomahawk Operational Readiness Document (ORD). ***FY 2020 Base Plans:*** Continue TTWCS software development efforts necessary to enable Tomahawk navigation and communications modernization. Conduct integration and functional testing for TTWCS v5.6 which includes A2AD navigation and modernization improvements. Correct and verify software deficiencies found in segment testing and develop final software "fix-it" build for system level test events. Continue TTWCS ship test, ship certifications and prepare for operational test events. Perform nonrecurring engineering activities, systems and software development, integration and testing of capability upgrades to address emergent threats, Urgent Operational Needs (UONS), fleet gaps, and the Tomahawk Operational Readiness Document (ORD). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 decrease of $1.134 million due to due to reduced requirement to conduct studies to modernize Tomahawk as a result of funded Tomahawk development efforts in previous budget cycles.					
Accomplishments/Planned Programs Subtotals	0.000	23.389	17.998	0.000	17.998

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN 5253: *Tomahawk Support Equipment*	73.184	86.045	78.593	-	78.593	95.438	108.493	86.741	85.304	Continuing	Continuing
• OPN 9020: *Initial and Vendor Direct Spares*	0.311	0.365	0.095	-	0.095	0.180	0.199	0.219	0.223	Continuing	Continuing
• WPN 2101: *Tomahawk*	187.354	98.570	386.730	-	386.730	373.963	220.141	317.815	280.825	1,438.643	16,756.166
• WPN 6120: *Spares and Repair Parts*	13.518	25.096	23.801	-	23.801	19.575	18.707	22.499	22.949	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4036 / *TTWCS TMPC PPPI*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

TMPC and TTWCS require periodic hardware and software updates to maintain compliance with Information Assurance (IA) standards and maintain system relevance against emerging threats. TMPC and TTWCS segments will rely on a blend of industry and government expertise through the remaining life of the program.

E. Performance Metrics

In the area of the weapons control system, research and development is performed to ensure viability and usability of the system into the future, providing necessary upgrades to meet the Department of Defense Information Technology standards registry to comply with FORCEnet requirements and be Internet Protocol Version 6 ready to remain interoperable within Joint Service Architecture, in order to provide battle-group tactical flexibility and responsiveness needed to enable full wartime capability.

In the area of the TMPC, research and development is performed in order to provide scalable configurations to deploy where and as needed to provide necessary command and control, conduct development necessary to function with national and tactical imagery architectures, support new TWS capabilities, decrease mission planning time, and increase the quality and accuracy of each mission for the TWS.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4036 / *TTWCS TMPC PPPI*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TMPC 7.0	SS/CPFF	Perspecta : San Jose, CA	0.000	0.000		5.675	Dec 2018	0.228	Dec 2019	-		0.228	Continuing	Continuing	Continuing
TMPC 7.0	SS/CPFF	Tapestry : St. Louis, MO	0.000	0.000		1.407	Dec 2018	0.095	Dec 2019	-		0.095	Continuing	Continuing	Continuing
TMPC 7.0	SS/CPFF	BAE Systems : San Diego, CA	0.000	0.000		1.331	Dec 2018	0.095	Dec 2019	-		0.095	Continuing	Continuing	Continuing
TMPC 7.0	SS/CPFF	Leidos : California, MD	0.000	0.000		5.703	Dec 2018	4.736	Dec 2019	-		4.736	Continuing	Continuing	Continuing
TMPC 7.0	SS/CPFF	UARC APL : Laurel, MD	0.000	0.000		0.111	Nov 2018	0.105	Nov 2019	-		0.105	Continuing	Continuing	Continuing
TMPC 7.0	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		2.323	Nov 2018	1.291	Dec 2019	-		1.291	Continuing	Continuing	Continuing
TMPC 8.0	SS/CPFF	Perspecta : San Jose, CA	0.000	0.000		0.362	Dec 2018	1.137	Dec 2019	-		1.137	Continuing	Continuing	Continuing
TMPC 8.0	SS/CPFF	Tapestry : St. Louis, MO	0.000	0.000		0.328	Nov 2018	2.029	Nov 2019	-		2.029	Continuing	Continuing	Continuing
TMPC 8.0	SS/CPFF	BAE Systems : San Diego, CA	0.000	0.000		0.328	Nov 2018	0.791	Nov 2019	-		0.791	Continuing	Continuing	Continuing
TMPC 8.0	SS/CPFF	Leidos : California, MD	0.000	0.000		0.618	Nov 2018	2.965	Nov 2019	-		2.965	Continuing	Continuing	Continuing
TMPC 8.0	SS/CPFF	UARC APL : Laurel, MD	0.000	0.000		0.084	Nov 2018	0.890	Nov 2019	-		0.890	Continuing	Continuing	Continuing
TMPC 8.0	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.277	Nov 2018	0.949	Nov 2019	-		0.949	Continuing	Continuing	Continuing
Systems Engineering - TTWCS A2AD Improvements (NAV/ COMMS)	WR	NSWC : Dahlgren, VA	0.000	0.000		1.180	Dec 2018	0.641	Dec 2019	-		0.641	Continuing	Continuing	Continuing
Systems Engineering- TTWCS Software Support Activity(NAV/COMMS)	SS/CPFF	LMVF : Valley Forge, PA	0.000	0.000		0.785	Dec 2018	0.516	Dec 2019	-		0.516	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		20.512		16.468		-		16.468	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / *Tomahawk Mssn Planning Ctr*	Project (Number/Name) 4036 / *TTWCS TMPC PPPI*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

TMPC 7.0 - Implements functionality to support Maritime Strike Tomahawk. Aligns with PU 4034.

TMPC 8.0 - Software development and integration in FY20 implement functionality to support GPS M-Code and JMEWS. Aligns with PU 4033 and 4035.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TMPC 6.0	SS/CPFF	Perspecta : San Jose, CA	0.000	0.000		0.988	Dec 2018	0.508	Dec 2019	-		0.508	0.000	1.496	1.496
TMPC 6.0	SS/CPFF	Leidos : California, MD	0.000	0.000		1.129	Nov 2018	0.588	Nov 2019	-		0.588	0.000	1.717	1.717
PPPI Development Support	WR	NAWC-WD : China Lake, CA	0.000	0.000		0.760	Nov 2018	0.434	Nov 2019	-		0.434	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		2.877		1.530		-		1.530	Continuing	Continuing	N/A

Remarks

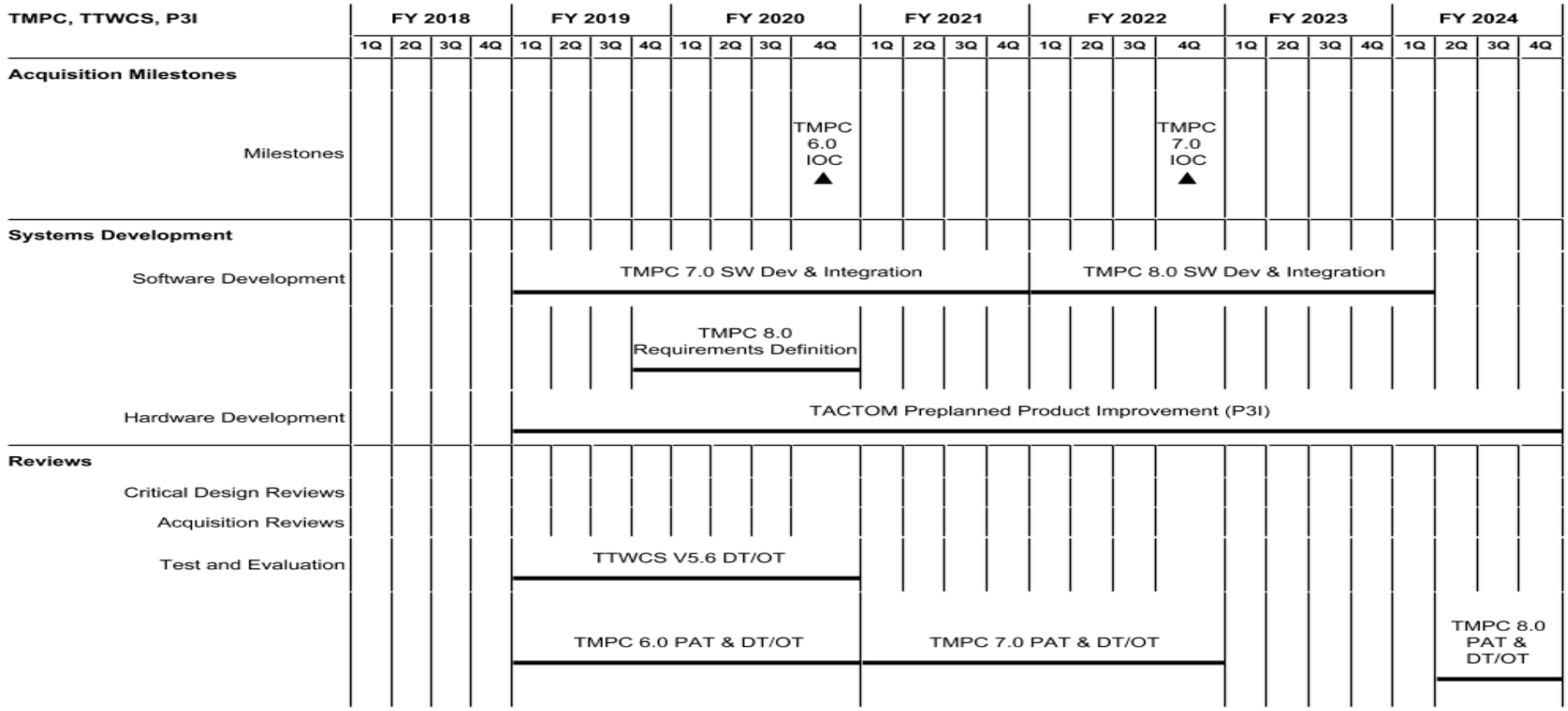
Pre-Planned Product Improvement efforts (PPPI) required to perform nonrecurring engineering activities, systems and software development, integration and testing of capability upgrades to address emergent threats, UONS, fleet gaps, and the Tomahawk ORD.

TMPC 6.0 - Missile Modernization; Timeline Improvements; Communications Upgrades; deploys to all sites, IOC 4th Qtr FY20. Aligns with PU: 4032.

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		23.389		17.998		-		17.998	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4036 / *TTWCS TMPC PPPI*



2020PB - 0204229N - 4036

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204229N / *Tomahawk Mssn Planning Ctr*	**Project (Number/Name)** 4036 / *TTWCS TMPC PPPI*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
TMPC, TTWCS, P3I				
Acquisition Milestones: Milestones: TMPC 6.0 IOC	4	2020	4	2020
Acquisition Milestones: Milestones: TMPC 7.0 IOC	4	2022	4	2022
Systems Development: Software Development: TMPC 7.0 SW Dev & Integration	1	2019	4	2021
Systems Development: Software Development: TMPC 8.0 SW Dev & Integration	1	2022	1	2024
Systems Development: Software Development: TMPC 8.0 Requirements Definition	4	2019	4	2020
Systems Development: Hardware Development: TACTOM Preplanned Product Improvement (P3I)	1	2019	4	2024
Reviews: Test and Evaluation: TTWCS V5.6 Modernized Missile DT/OT	1	2019	4	2020
Reviews: Test and Evaluation: TMPC 6.0 Product Acceptance Testing (PAT) & DT/OT	1	2019	4	2020
Reviews: Test and Evaluation: TMPC 7.0 Product Acceptance Testing (PAT) & DT/OT	1	2021	4	2022
Reviews: Test and Evaluation: TMPC 8.0 Product Acceptance Testing (PAT) & DT/OT	2	2024	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204311N *I Integrated Surveillance System*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	463.073	55.164	71.959	88.382	-	88.382	100.754	95.332	84.608	86.298	Continuing	Continuing
0344: *SUB AUXILIARIES*	0.000	0.000	0.000	8.500	-	8.500	22.500	25.100	24.400	24.888	Continuing	Continuing
0766: *IUSS Detect/Classif System*	463.073	55.164	36.959	59.882	-	59.882	60.754	60.232	60.208	61.410	Continuing	Continuing
1768: *Ship Plan Development and Design*	0.000	0.000	0.000	20.000	-	20.000	17.500	10.000	0.000	0.000	0.000	47.500
9999: *Congressional Adds*	0.000	0.000	35.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	35.000

Note

Projects 0344 (Sub Auxiliaries) and 1768 (Ship Plan Development and Design) are new start programs.

A. Mission Description and Budget Item Justification

The FY20 funding request was reduced by $3.000 million to account for the availability of prior year execution balances.

Project 0766 provides for Integrated Undersea Surveillance Systems (IUSS) Research and Development Projects under the Maritime Surveillance Systems (MSS) Program Office (PEO SUB PMS 485). IUSS provides the Navy with its primary means of submarine detection, both nuclear and diesel. A portion of project 0766 Fixed Surveillance System (FSS) is classified, with details available at a higher classification level.

The IUSS Research and Development project (0766) funds Surveillance Towed Array Sensor System (SURTASS) Passive and SURTASS Low Frequency Active (LFA) developments. SURTASS provides the mobile, tactical arm of the Integrated Undersea Surveillance System, providing long range detection and cueing for tactical weapons platforms or other vessels of interest. SURTASS LFA provides an active adjunct capability for IUSS passive and tactical sensors to assist in countering the quieter diesel and nuclear threats of the 1990s and beyond. The LFA tasks are directed at detection of slow quiet threats in harsh littoral waters.

Development and improvement continues on the common IUSS processor based on NAVSEA's Acoustic Rapid Commercial Off The Shelf (COTS) Insertion (ARCI) program with a cyclical tech refresh of hardware and software in conjunction with the submarine Advanced Processor Build (APB) process. The IUSS Integrated Common Processor (ICP) has the capability to process and display data from all fixed and mobile underwater systems. The IUSS ICP is used for all new system installations and replaces the legacy systems as they reach end of life and require upgrading. Additionally, SURTASS consolidated on the TB-29A Twin-line array, a variant of the Submarine TB-29A Long line array. This reduced the number of array variants employed by SURTASS from 3 to 1, and enabled development and logistics cost savings by leveraging off the submarine TB-29A program.

The Navy's Theater Anti-Submarine Warfare (TASW) Offset Strategy responds to an urgent EUROCOM/AFRICOM requirement for additional maritime intelligence, surveillance, and reconnaissance capabilities. PEO SUB, in conjunction with COMSUBFOR and CNO, directed a rapid prototyping program be undertaken utilizing

systems developed by the Office of Naval Research (ONR), the Defense Advanced Research Projects Agency (DARPA) and the Naval Undersea Warfare Center (NUWC). Development of TASW capabilities to meet TASW requirements against evolving threats in the EUROCOM/AFRICOM Area of Responsibility (AOR) will also serve to address similar requirements globally. In FY16, funds were reprogrammed to complete the first prototype contracting and deployment in support of the Navy's TASW Offset Strategy. In FY17, the IUSS Research and Development project (0766) funded the second major prototype contracting, refurbishment and deployment to support the Navy's TASW Offset Strategy. In FY18, the IUSS Research and Development project (0766) Overseas Contingency Operations (OCO) funded the third major prototype contracting, refurbishment and deployment to support the Navy's TASW Offset Strategy. Reprogrammed dollars funded non-recurring engineering updates focused on increasing Transformational Reliable Acoustic Path System (TRAPS) reliability. In FY19, Congressional budget additions funded the fourth major prototype contracting, refurbishment, and deployment. This is a Military Intelligence Program (MIP).

Project 0344 funds the Deployable System of Systems project which complements FSS and SURTASS by providing flexibility to TASW commanders worldwide by allowing the Fleet to address operational gaps in wide area undersea surveillance by using a deep water deployable system.

Project 1768 T-ARC(X) is a candidate replacement program for U.S. Navy's only organic undersea cable laying and repair ship, USNS ZEUS (T-ARC 7), which is approaching the end of her extended service life. The ship's main mission is to deploy, repair, and retrieve undersea cables and equipment, with a secondary mission of conducting acoustic, hydrographic and bathymetric surveys.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	38.972	36.959	59.619	-	59.619
Current President's Budget	55.164	71.959	88.382	-	88.382
Total Adjustments	16.192	35.000	28.763	-	28.763
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	35.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	4.592	0.000			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	11.600	0.000	28.763	-	28.763
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *Additional TRAPS Units*	0.000	35.000
Congressional Add Subtotals for Project: 9999	0.000	35.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204311N *I Integrated Surveillance System*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Congressional Add Totals for all Projects	0.000	35.000

Change Summary Explanation

Program Adjustments:

FY20 increase of $28.763M: The FY20 funding request was reduced by $3.000 million to account for the availability of prior year execution balances. Other program adjustments included: $20.0M increase (Project 1768) to PE 0204311N to begin initial research and design for a follow-on Cable ship to replace the aging USNS Zeus; $11.9M increase (Project 0766.S41)for design and development of Underwater Segment advanced sensor technology and associated processing, and design to support alternative technologies.

FY19 Increase of $35.000M: $35.0M Congressional Add (Project 9999) for additional Transformational Reliable Acoustic Path System (TRAPS) units.

FY18 increase of $16.192M: $11.6M (Project 0766.L24) for OCO requirements and $4.592M (Project 0766.L24) reprogramming for TRAPS.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204311N / *Integrated Surveillance System*	Project (Number/Name) 0344 / *SUB AUXILIARIES*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0344: *SUB AUXILIARIES*	0.000	0.000	0.000	8.500	-	8.500	22.500	25.100	24.400	24.888	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Project 0344 is a new start program.

A. Mission Description and Budget Item Justification

The Deployable Family of Systems (DFoS) project (0344), complementing FSS and SURTASS, provides flexible and responsive wide area surveillance to the Theater Anti-Submarine Warfare (TASW) commanders worldwide. DFoS will operate as adjunct systems to meet the established FSS and SURTASS missions and to meet additional missions as articulated in the OPNAV Top Level Requirements document and follow-on Course of Action Analysis (COAA) and as dictated by TASW commanders evolving and emergent operational requirements. DFoS is comprised of the following systems: Deep Water Passive (DWP), Deep Water Active (DWA), and Mobile Passive System (MPS). Informed by TASW Offset operations and the tailored requirements process, the DFoS Program of Record (POR) will focus initially on the DWP increment and associated spiral development updates. Spiral developments to meet the evolving submarine threat will leverage on-going Navy, DARPA, and small business research efforts including processing and sensor technology. Follow-on increments will be focused on DWA and MPS.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Deployable Family of Systems (DFoS)	0.000	0.000	8.500	0.000	8.500
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: - Conduct technology risk reduction and integration in the Software sub-system as identified in the OPNAV DFoS Validated Requirements and as informed by TASW Offset Operations (Software Integration/Algorithm Development). - Conduct technology risk reduction and integration in the C4I sub-system as identified in OPNAV DFoS Validated Requirements and as informed by TASW Offset Operations (C4I Integration/S&T). - Award DWP Spiral 2 competitive contract.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0344 / *SUB AUXILIARIES*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The FY 2020 funding request in the amount of $8.5M is initial funding for the DFoS POR.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	8.500	0.000	8.500

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

FY 2019: DWP Spiral 2 Acquisition Strategy (AS)
FY 2020: DWP Spiral 2 Rapid Fielding
FY 2020: Initiate DWP Spiral 2 Low Rate Initial Production (LRIP)
FY 2020-2021: Engineering: DWP Risk Reduction
FY 2020-2021: Software Integration - Build 21
FY 2020-2021: C4I Integration Stage 1
FY 2021: DWP Spiral 2 Production Readiness Review (PRR)
FY 2022: Deep Water Active (DWA) and Mobile Passive/Active System (MPAS) Course of Action Analysis (COAA), TLR, and Quick Reaction Assessment (QRA)
FY 2023: DWP Spiral 2 Post Implementation Review (PIR)
FY 2023: Initiate DWP Spiral 2 Full Rate Production (FRP)
FY 2024: DWA Rapid Prototyping and AP

E. Performance Metrics

Requirements documents (Top Level Requirements (TLR)) under development (FY19 TLR development cost administered by OPNAV N974B).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0344 / *SUB AUXILIARIES*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DFoS Processing	C/CPFF	APL/JHU : MD	0.000	0.000		0.000		0.440	Mar 2020	-		0.440	Continuing	Continuing	Continuing
DFoS Processing	C/CPFF	Leidos : MS	0.000	0.000		0.000		1.450	Jan 2020	-		1.450	Continuing	Continuing	Continuing
DFoS Processing	C/CPFF	Sandia National Lab : NM	0.000	0.000		0.000		0.300	Dec 2019	-		0.300	Continuing	Continuing	Continuing
DFoS Processing	C/CPFF	Proteq : VA	0.000	0.000		0.000		1.200	Feb 2020	-		1.200	Continuing	Continuing	Continuing
DFoS Risk Reduction	Various	Various : Various	0.000	0.000		0.000		0.500	Nov 2019	-		0.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		3.890		-		3.890	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DFoS C4I Integration	WR	SSC Pacific : CA	0.000	0.000		0.000		1.900	Nov 2019	-		1.900	Continuing	Continuing	Continuing
DFoS C4I Integration	WR	NUWC Newport : RI	0.000	0.000		0.000		1.985	Nov 2019	-		1.985	Continuing	Continuing	Continuing
DFoS C4I Integration	WR	Navy Research Lab : DC	0.000	0.000		0.000		0.300	Jan 2020	-		0.300	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		4.185		-		4.185	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DFoS	C/CPFF	BAH : VA	0.000	0.000		0.000		0.425	Jan 2020	-		0.425	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.425		-		0.425	Continuing	Continuing	N/A

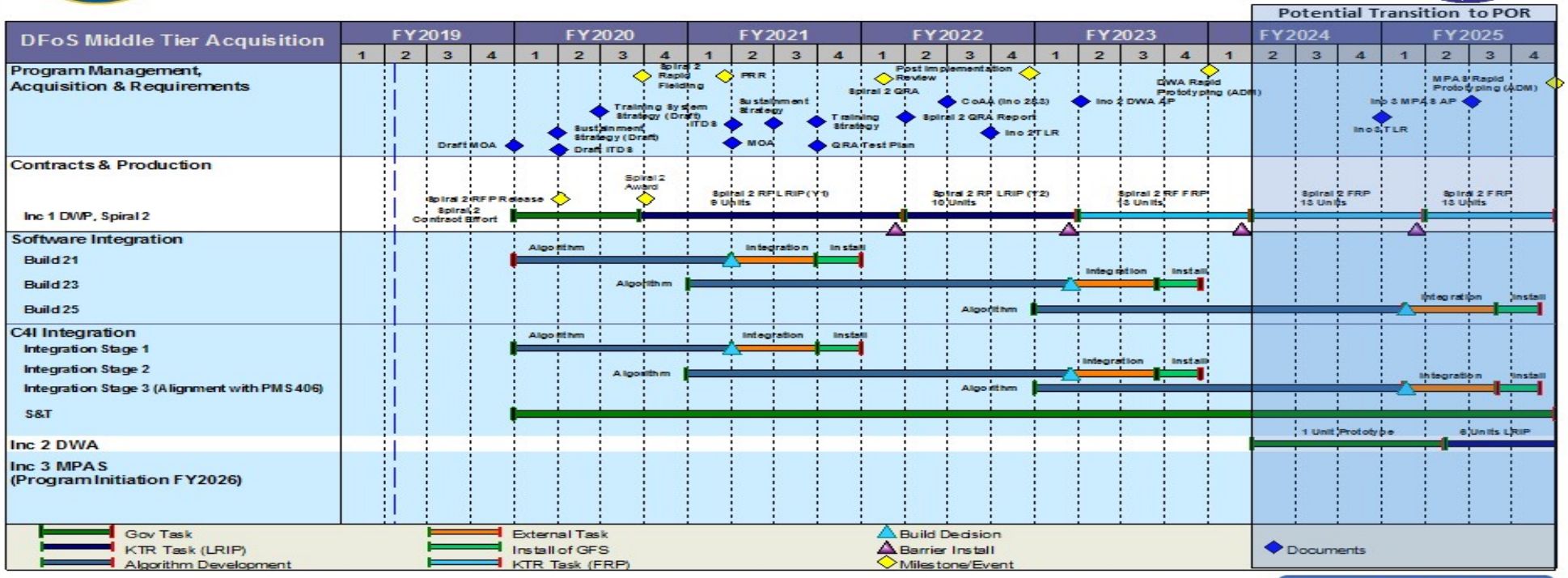
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		8.500		-		8.500	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0344 / *SUB AUXILIARIES*

UNCLASSIFIED

DFoS Middle Tier Acquisition



Status Date: 20190128

Acquisition Decision Memorandum (ADM)
Acquisition Plan (AP)
Course of Action Analysis (CoAA)
Deep Water Active (DWA)
Deep Water Passive (DWP)
Information Technology Development Strategy (ITDS)
Low Rate Initial Production (LRIP)
Mobile Passive/Active System (MPAS)
Production Readiness Review (PRR)
Quick Reaction Assessment (QRA)
Rapid Fielding (RF)
Request For Proposal (RFP)
Science & Technology (S&T)
Top-Level Requirements (TLR)

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0344 / *SUB AUXILIARIES*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0344				
Test and Evaluation Milestones: Quick Reaction Assessment (QRA): DWP Spiral 2 QRA	1	2022	1	2022
Production Milestones: DWP Acquisition Documentation: DWP Spiral 2 Contract Award	3	2020	3	2020
Production Milestones: DFoS Software Integration: Build 21 Software Algorithm Development	1	2020	2	2021
Production Milestones: DFoS Software Integration: Build 21 Software Integration and Test	2	2021	3	2021
Production Milestones: DFoS Software Integration: Build 21 Software Installation	4	2021	1	2022
Production Milestones: DFoS Software Integration: Build 23 Software Algorithm Development	1	2021	1	2023
Production Milestones: DFoS Software Integration: Build 23 Software Integration and Test	1	2023	3	2023
Production Milestones: DFoS Software Integration: Build 23 Software Installation	3	2023	4	2023
Production Milestones: C4I Integration: Integration Stage 1	1	2020	4	2021
Production Milestones: C4I Integration: Integration Stage 2	1	2021	4	2023
Production Milestones: C4I Integration: Integration Stage 3	1	2023	4	2024
Production Milestones: DWP Low Rate Initial Production (LRIP): DWP Spiral 2 LRIP (9 Units)	3	2020	1	2022
Production Milestones: DWP Low Rate Initial Production (LRIP): DWP Spiral 2 LRIP (10 (Units)	2	2022	1	2023
Production Milestones: DWP Full Rate Production (FRP): DWP Spiral 2 FRP (13 Units)	2	2023	1	2024
Production Milestones: Rapid Prototyping: DWA Rapid Prototyping	1	2024	1	2024

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0344 / *SUB AUXILIARIES*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: DWA Prototype: DWA Prototype (1 Unit)	2	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204311N / *Integrated Surveillance System*	Project (Number/Name) 0766 / *IUSS Detect/Classif System*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0766: *IUSS Detect/Classif System*	463.073	55.164	36.959	59.882	-	59.882	60.754	60.232	60.208	61.410	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

A. This project includes efforts for SURTASS and the Theater ASW Offset Initiative. The SURTASS project comprises the mobile, tactical arm of the Integrated Undersea Surveillance System, providing long range detection and cueing for tactical weapons platforms against both diesel and nuclear powered submarines. SURTASS also provides the undersea surveillance necessary to support regional conflicts and sea-lane protection. SURTASS has experienced recent passive and active success against diesel submarines operating in shallow water. SURTASS is leveraging existing developments and reducing costs by using Non-Developmental Items and commercial hardware, supporting common Navy Undersea Warfare processing and towed array developments, and increasing operator efficiency through computer-aided detection and classification processing. SURTASS development efforts include Low Frequency Active (LFA)/Compact Low Frequency Active (CLFA) improvements, common IUSS processing, twin-line array development and processing, improved detection and classification/passive automation to counter quieter threats, additional signal processing, integrated active and passive operations, improved Battle Group support, and improved information processing.

LFA provides an active adjunct capability for IUSS passive and tactical sensors to counter the quieter diesel and nuclear threats of the 1990s and beyond. The LFA tasks are directed at detection of slow, quiet threats in harsh littoral waters. Improvements include TL-29A/LFA integration enhancements, advanced waveforms for littoral/shallow water operations including Doppler sensitive waveforms, and processing algorithms to reduce clutter and reverberation false alarms in shallow water. The Integrated Common Processor (ICP) is a derivative of the NAVSEA Submarine Acoustic Rapid Commercial Off the Shelf (COTS) Insertion (ARCI) program, and is being augmented for IUSS requirements. Together, the LFA/CLFA improvements, TL-29A, and the ICP support the SURTASS Active Improvement Program.

Functional improvements to ICP are delivered to the Fleet in software "builds" while hardware improvements are delivered through the Tech Insertion (TI) process. Software improvements delivered via the Advanced Surveillance Build (ASB) process are based on the Advanced Processor Build (APB) process begun by the NAVSEA Submarine USW program. Each ASB will introduce new capabilities into SURTASS systems including improved automation, normalizer techniques, adaptive beam forming, and display enhancements. SURTASS participates in the process by contributing algorithms for consideration, supplying peer group members for review of candidate algorithms, participating in test evolutions, and incorporating improved algorithms into operational systems. The TI process, modeled after the NAVSEA Submarine Undersea Warfare (USW) hardware improvement program, delivers processing technology improvements to platforms on roughly a 4-6 year cycle. Hardware upgrades for active and passive arrays and communications systems will also be provided during TI upgrades, but not on a regular planned development cycle as for the processing upgrades.

B. PEO SUB is involved with the development and maintenance of various IUSS systems. These systems include Fixed Distributed systems (FDS), Fixed Distributed Systems-Commercial (FDS-C), and SURTASS. The existing system architectures, signal processing, contact management, and reporting requirements will be evaluated as well as the requirements for future systems. The cyclical development of the ICP will take advantage of automation advancement, array technology improvements, along with IUSS, submarine, and surface USW system commonality to address these requirements.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0766 / *IUSS Detect/Classif System*

C. Theater Anti-Submarine Warfare Strategy (TASW) Offset Initiative responds to an urgent EUROCOM/AFRICOM requirement for additional maritime intelligence, surveillance, and reconnaissance capabilities. PEOSUB, in conjunction with COMSUBFOR and CNO, directed a rapid prototyping program be undertaken utilizing systems developed by the Office of Naval Research (ONR), the Defense Advanced Research Projects Agency (DARPA) and the Naval Undersea Warfare Center (NUWC). Development of TASW capabilities to meet TASW requirements against evolving threats in the EUROCOM/AFRICOM Area of Responsibility (AOR) will also serve to address similar requirements globally.
The FSS portion of 0766 is classified with details available at a higher classification level.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Integrated Common Processor (ICP)	15.831	13.650	18.481	0.000	18.481
Articles:	-	-	-	-	-
FY 2019 Plans: - Develop Advanced Surveillance Build (ASB)-19 / ASB-20 processing capabilities. - ASB-19/20 improvements planned for completion in FY 2019 include: Improved Single line Adaptive Beam Forming (ABF) in order to provide a common single and twin line ABF, An improved Acoustic Profiler Mitigation (APM) capability providing enhanced profiler acoustic content discrimination, Enhanced ship to shore data throughput through improvements to the Multi-Layer Passive Acoustic Compression (MPAC) algorithm, Improved trackers that will enhance operator's ability to track during maneuvers and heading changes, Multiple Resolution displays to improve operator efficiencies - Develop Technology Insertion (TI)-20 hardware improvements for cyber security, Program Protection (afloat and Engineering Measurements Program (EMP)), and to address hardware obsolescence					
FY 2020 Base Plans: - Develop Advanced Surveillance Build (ASB)-19 / ASB-20 processing capabilities. - ASB-19/20 improvements planned for completion in FY 2020 include: Kinematic tracker improvements to enhance operator's ability to track during maneuvers and heading changes, Contact History profile enhancements to aide operator association of possible contacts, Narrowband Acoustic paging improvements in order to rapidly scan large quantities of data,Improvements in the area of automatic detection					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The FY20 increase is to support accelerated transition of Cyber Security and Program Protection improvements, as well as Operator Workload Reduction (OWR) capabilities.					
Title: Compact Low Frequency Active (CLFA)	2.000	2.000	3.000	0.000	3.000
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue product improvement and upgrade efforts associated with CLFA and LFA OT&E - Continue development of cyber security enhancements - Conduct pier-side and at-sea test and evaluations of LFA/CLFA system performance enhancements. - Conduct yearly cyber security evaluation and testing of deployed systems. - Investigate future active systems to outfit T-AGOS (X).					
FY 2020 Base Plans: - Continue product improvement and upgrade efforts associated with CLFA and LFA OT&E - Continue development of cyber security enhancements. - Conduct pier-side and at-sea test and evaluations of LFA/CLFA system performance enhancements. - Conduct yearly cyber security evaluation and testing of deployed systems. - Continue investigation of future active systems to outfit T-AGOS (X).					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The FY 2020 funding increase in the amount of $1M supports increased active system development efforts in support of T-AGOS (X).					
Title: TL-29A/Twin-Line	2.000	2.000	3.000	0.000	3.000
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue development of upgraded telemetry components to address component obsolescence. - Continue development of fishing net mitigation solutions and upgrades to reduce potential for array damage from fishing apparatus. - Continue at-sea test and evaluation efforts to demonstrate passive array system enhancements and net mitigation equipment.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue evaluation of true fiber optic array technologies and array components, including Twin-line variants of new submarine Long-line arrays for future application to SURTASS. ***FY 2020 Base Plans:*** - Continue development of upgraded telemetry components to address component obsolescence. - Continue development of fishing net mitigation solutions and upgrades to reduce potential for array damage from fishing apparatus. - Continue at-sea test and evaluation efforts to demonstrate passive array system enhancements and net mitigation equipment. - Continue evaluation of true fiber optic array technologies and array components, including Twin-line variants of new submarine Long-line arrays for future application to SURTASS. - Investigate future passive systems to outfit T-AGOS(X). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding increase in the amount of $1M supports initial passive system development efforts in support of T-AGOS(X).					
Title: Theater Anti-Submarine Warfare (TASW) ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	16.192 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: Classified Effort ***Articles:*** ***Description:*** The FSS portion of 0766 is classified with details available at a higher classification level. ***FY 2019 Plans:***	19.141 -	19.309 -	35.401 -	0.000 -	35.401 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The FSS portion of 0766 is classified with details available at a higher classification level. ***FY 2020 Base Plans:*** The FSS portion of 0766 is classified with details available at a higher classification level. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request was increased by $16.1M for design and development of Underwater Segment advanced sensor technology and associated processing, and design to support alternative installation technologies ($15.2M), as well as, increased Advanced Surveillance Build (ASB) processing improvements for the Integrated Common Processor ($0.9M).					
Accomplishments/Planned Programs Subtotals	55.164	36.959	59.882	0.000	59.882

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2237: *SURTASS*	36.580	57.872	21.923	-	21.923	17.977	24.278	24.723	25.218	Continuing	Continuing

Remarks

D. Acquisition Strategy

FY 2014: ICP Tech Refresh. CLFA OT/CLFA/TL-29A/ICP FOT&E
FY 2015: ICP Tech Refresh. LFA/CLFA/TL-29A/ICP FOT&E
FY 2016: ICP Tech Refresh. ASB Step 4 Testing.
FY 2017: ICP Tech Refresh. CLFA/TL-29A/ICP FOT&E
FY 2018: ICP Tech Refresh. ASB Step 4 Testing.
FY 2018: LFA/TL-29A/ICP FOT&E
FY 2019: ICP Tech Refresh. CLFA/TL-29A/ICP FOT&E
FY 2020: ASB Step 4 Testing. LFA/CLFA/TL-29A/ICP FOT&E
The FSS portion of 0766 is classified with details available at a higher classification level.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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E. Performance Metrics

Successfully complete CLFA Operational Test Readiness Review. Successfully complete CLFA Developmental Test / Operational Test. Successful demonstration of required LFA/CLFA improvements capability. Successful transition of Submarine Advanced Processing Build (APB) functionality and advanced capabilities into IUSS products. Successful transition of net mitigation technologies into Towed Array baseline.
The FSS portion of 0766 is classified with details available at a higher classification level.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204311N / *Integrated Surveillance System*	Project (Number/Name) 0766 / *IUSS Detect/Classif System*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IUSS COMMON ARCHITECTURE	C/CPFF	LOCKHEED MARTIN : VA	39.196	6.326	Dec 2017	5.437	Dec 2018	7.505	Dec 2019	-		7.505	Continuing	Continuing	Continuing
IUSS COMMON ARCHITECTURE	SS/CPFF	APL/JHU : MD	4.128	1.054	Apr 2018	1.170	Apr 2019	1.586	Apr 2020	-		1.586	Continuing	Continuing	Continuing
IUSS COMMON ARCHITECTURE	Various	VARIOUS : Not Specified	69.693	2.056	Dec 2017	1.765	Dec 2018	2.393	Dec 2019	-		2.393	Continuing	Continuing	Continuing
IUSS COMMON ARCHITECTURE	C/CPFF	ADAPTIVE Methods : VA	3.337	0.774	Dec 2017	0.680	Dec 2018	0.922	Dec 2019	-		0.922	Continuing	Continuing	Continuing
ACTIVE IMPROVEMENT/ CLFA/LFA	WR	NFESC : CA	2.533	0.414	Dec 2017	0.413	Dec 2018	0.620	Dec 2019	-		0.620	Continuing	Continuing	Continuing
ACTIVE IMPROVEMENT/ CLFA/LFA	WR	SSC PAC : CA	1.752	0.199	Nov 2017	0.197	Nov 2018	0.296	Nov 2019	-		0.296	Continuing	Continuing	Continuing
ACTIVE IMPROVEMENT/ CLFA/LFA	SS/CPFF	APL/JHU : MD	3.372	0.512	Apr 2018	0.509	Apr 2019	0.796	Apr 2020	-		0.796	Continuing	Continuing	Continuing
ARRAY IMPROVEMENTS	SS/CPFF	APL/JHU : VA	4.307	0.920	Apr 2018	0.927	Apr 2019	1.150	Apr 2020	-		1.150	Continuing	Continuing	Continuing
ARRAY IMPROVEMENTS	SS/CPFF	ADAPTIVE METHODS : VA	1.750	0.339	Dec 2017	0.321	Dec 2018	0.482	Dec 2019	-		0.482	Continuing	Continuing	Continuing
ARRAY IMPROVEMENTS	Various	VARIOUS : Not Specified	10.115	0.441	Jan 2018	0.448	Jan 2019	0.672	Jan 2020	-		0.672	Continuing	Continuing	Continuing
TASW FIELDING	Various	SSC PAC : CA	3.932	0.200	Dec 2017	0.000		0.000		-		0.000	0.000	4.132	-
TASW FIELDING	Various	NUWC NEWPORT : RI	2.543	0.300	Nov 2017	0.000		0.000		-		0.000	0.000	2.843	-
TASW FIELDING	SS/CPFF	APL/UW : WA	13.074	0.900	Feb 2018	0.000		0.000		-		0.000	0.000	13.974	-
TASW FIELDING	Various	VARIOUS : CA	2.284	0.000		0.000		0.000		-		0.000	0.000	2.284	-
TASW FIELDING	C/CPFF	LEIDOS : CA	54.410	10.092	Dec 2017	0.000		0.000		-		0.000	0.000	64.502	-
TASW FIELDING	C/CPFF	PROTEQ : VA	2.830	1.000	Mar 2018	0.000		0.000		-		0.000	0.000	3.830	-
TASW FIELDING	SS/CPFF	SANDIA : NM	0.621	0.000		0.000		0.000		-		0.000	0.000	0.621	-
TASW FIELDING	WR	NAVY OCEANOGRAPHIC OFFICE : MS	0.000	0.200	Feb 2018	0.000		0.000		-		0.000	0.000	0.200	-
FSS - Classified	Various	TBD : Not Specified	149.680	19.141	Nov 2017	19.309	Nov 2018	35.401	Nov 2019	-		35.401	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0766 / *IUSS Detect/Classif System*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	369.557	44.868		31.176		51.823		-		51.823	Continuing	Continuing	N/A

Remarks

The FSS portion of 0766 is classified with details available at a higher classification level.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IUSS COMMON ARCHITECTURE	WR	SSC PAC : CA	4.623	0.412	Nov 2017	0.362	Nov 2018	0.491	Nov 2019	-		0.491	Continuing	Continuing	Continuing
IUSS COMMON ARCHITECTURE	C/CPFF	APL/JHU : MD	3.142	1.537	Apr 2018	1.007	Apr 2019	1.365	Apr 2020	-		1.365	Continuing	Continuing	Continuing
IUSS COMMON ARCHITECTURE	C/CPFF	Lockheed Martin : VA	4.158	1.012	Dec 2017	0.889	Dec 2018	1.205	Dec 2019	-		1.205	Continuing	Continuing	Continuing
IUSS COMMON ARCHITECTURE	Various	VARIOUS : Not Specified	5.303	0.414	Jan 2018	0.364	Jan 2019	0.494	Jan 2020	-		0.494	Continuing	Continuing	Continuing
ACTIVE IMPROVEMENT/ CLFA/LFA	WR	SSC PAC : CA	1.123	0.195	Nov 2017	0.195	Nov 2018	0.292	Nov 2019	-		0.292	Continuing	Continuing	Continuing
ACTIVE IMPROVEMENT/ CLFA/LFA	Various	VARIOUS : Not Specified	7.771	0.141	Jan 2018	0.141	Jan 2019	0.176	Jan 2020	-		0.176	Continuing	Continuing	Continuing
ARRAY IMPROVEMENTS	Various	VARIOUS : Not Specified	1.752	0.195	Jan 2018	0.197	Jan 2019	0.396	Jan 2020	-		0.396	Continuing	Continuing	Continuing
TASW FIELDING	WR	NUWC NEWPORT : MA	0.430	0.700	Nov 2017	0.000		0.000		-		0.000	0.000	1.130	-
TASW FIELDING	WR	NUWC KEYPORT : WA	0.525	0.120	Nov 2017	0.000		0.000		-		0.000	0.000	0.645	-
TASW FIELDING	SS/CPFF	APL/JHU : MD	1.100	0.200	Jan 2018	0.000		0.000		-		0.000	0.000	1.300	-
TASW FIELDING	WR	SSC PAC : CA	0.700	0.750	Nov 2017	0.000		0.000		-		0.000	0.000	1.450	-
		Subtotal	30.627	5.676		3.155		4.419		-		4.419	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IUSS COMMON ARCHITECTURE	C/CPFF	LOCKHEED MARTIN : VA	5.187	0.846	Dec 2017	0.745	Dec 2018	1.010	Dec 2019	-		1.010	Continuing	Continuing	Continuing
IUSS COMMON ARCHITECTURE	Various	VARIOUS : Not Specified	8.756	0.550	Jan 2018	0.487	Jan 2019	0.660	Jan 2020	-		0.660	Continuing	Continuing	Continuing
ACTIVE IMPROVEMENT/ CLFA/LFA	WR	OPTEVFOR : VA	0.647	0.095	Dec 2017	0.100	Dec 2018	0.125	Dec 2019	-		0.125	Continuing	Continuing	Continuing
ACTIVE IMPROVEMENT/ CLFA/LFA	Various	VARIOUS : Not Specified	21.003	0.084	Jan 2018	0.084	Jan 2019	0.126	Jan 2020	-		0.126	Continuing	Continuing	Continuing
ARRAY IMPROVEMENTS	SS/CPFF	APL/JHU : MD	1.125	0.235	Apr 2018	0.235	Apr 2019	0.413	Apr 2020	-		0.413	Continuing	Continuing	Continuing
TASW FIELDING	WR	NUWC NEWPORT : MA	0.399	0.300	Feb 2018	0.000		0.000		-		0.000	0.000	0.699	-
TASW FIELDING	WR	NAVY OCEANOGRAPHIC OFFICE : MS	0.914	0.030	Feb 2018	0.000		0.000		-		0.000	0.000	0.944	-
		Subtotal	38.031	2.140		1.651		2.334		-		2.334	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IUSS COMMON ARCHITECTURE	Various	VARIOUS : Not Specified	7.840	0.850	Jan 2018	0.745	Jan 2019	0.850	Jan 2020	-		0.850	Continuing	Continuing	Continuing
ACTIVE IMPROVEMENT/ CLFA/LFA	Various	VARIOUS : Not Specified	15.975	0.125	Jan 2018	0.125	Jan 2019	0.156	Jan 2020	-		0.156	Continuing	Continuing	Continuing
ARRAY IMPROVEMENTS	Various	VARIOUS : Not Specified	0.658	0.105	Jan 2018	0.107	Jan 2019	0.300	Jan 2020	-		0.300	Continuing	Continuing	Continuing
TASW FIELDING	C/CPFF	BAH : VA	0.385	1.400	Jan 2018	0.000		0.000		-		0.000	0.000	1.785	-
		Subtotal	24.858	2.480		0.977		1.306		-		1.306	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	463.073	55.164		36.959		59.882		-		59.882	Continuing	Continuing	N/A

Remarks

The R3 and the R4 / R4A reflect the UNCLASSIFIED portion of the PE.
The FSS portion of 0766 is classified with details available at a higher classification level.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0766 / *IUSS Detect/Classif System*

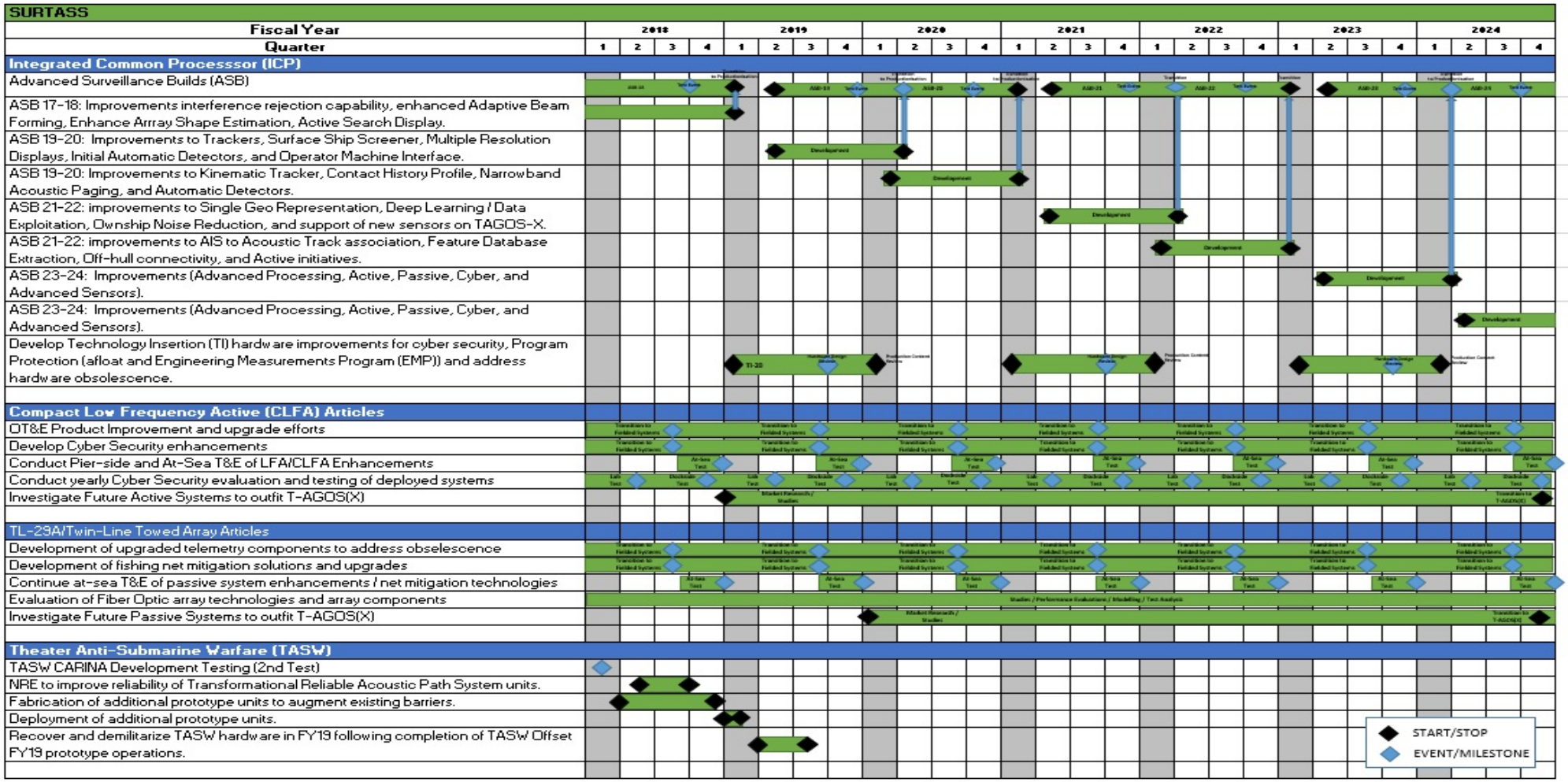

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0766.L24				
TEST and EVALUATION MILESTONES: CARINA Testing: CARINA Development Testing (2nd Test)	1	2018	1	2018
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: Pier-side and At-Sea T&E of LFA/CLFA Enhancements (2018)	3	2018	4	2018
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: Pier-side and At-Sea T&E of LFA/CLFA Enhancements (2019)	3	2019	4	2019
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: Pier-side and At-Sea T&E of LFA/CLFA Enhancements (2020)	3	2020	4	2020
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: Pier-side and At-Sea T&E of LFA/CLFA Enhancements (2021)	3	2021	4	2021
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: Pier-side and At-Sea T&E of LFA/CLFA Enhancements (2022)	3	2022	4	2022
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: Pier-side and At-Sea T&E of LFA/CLFA Enhancements (2023)	3	2023	4	2023
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: Pier-side and At-Sea T&E of LFA/CLFA Enhancements (2024)	3	2024	4	2024
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Security Evaluation and Testing (Yearly)	1	2018	4	2024
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Lab Test (2018)	2	2018	2	2018
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Dockside Test (2018)	4	2018	4	2018
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Lab Test (2019)	2	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Dockside Test (2019)	4	2019	4	2019
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Lab Test (2020)	2	2020	2	2020
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Dockside Test (2020)	4	2020	4	2020
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Lab Test (2021)	2	2021	2	2021
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Dockside Test (2021)	4	2021	4	2021
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Lab Test (2022)	2	2022	2	2022
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Dockside Test (2022)	4	2022	4	2022
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Lab Test (2023)	2	2023	2	2023
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Dockside Test (2023)	4	2023	4	2023
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Lab Test (2024)	2	2024	2	2024
TEST and EVALUATION MILESTONES: LFA/CLFA Testing: LFA/CLFA Cyber Dockside Test (2024)	4	2024	4	2024
TEST and EVALUATION MILESTONES: TL-29A Testing: TL-29A At-SEA T&E Passive System/Net Mitigation (2018)	3	2018	4	2018
TEST and EVALUATION MILESTONES: TL-29A Testing: TL-29A At-SEA T&E Passive System/Net Mitigation (2019)	3	2019	4	2019
TEST and EVALUATION MILESTONES: TL-29A Testing: TL-29A At-SEA T&E Passive System/Net Mitigation (2020)	3	2020	4	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
TEST and EVALUATION MILESTONES: TL-29A Testing: TL-29A At-SEA T&E Passive System/Net Mitigation (2021)	3	2021	4	2021
TEST and EVALUATION MILESTONES: TL-29A Testing: TL-29A At-SEA T&E Passive System/Net Mitigation (2022)	3	2022	4	2022
TEST and EVALUATION MILESTONES: TL-29A Testing: TL-29A At-SEA T&E Passive System/Net Mitigation (2023)	3	2023	4	2023
TEST and EVALUATION MILESTONES: TL-29A Testing: TL-29A At-SEA T&E Passive System/Net Mitigation (2024)	3	2024	4	2024
TEST and EVALUATION MILESTONES: ICP Advanced Surveillance Builds (ASB): ASB-18 Test Event	4	2018	4	2018
TEST and EVALUATION MILESTONES: ICP Advanced Surveillance Builds (ASB): ASB-19 Test Event	3	2019	3	2019
TEST and EVALUATION MILESTONES: ICP Advanced Surveillance Builds (ASB): ASB-20 Test Event	4	2020	4	2020
TEST and EVALUATION MILESTONES: ICP Advanced Surveillance Builds (ASB): ASB-21 Test Event	4	2021	4	2021
TEST and EVALUATION MILESTONES: ICP Advanced Surveillance Builds (ASB): ASB-22 Test Event	4	2022	4	2022
TEST and EVALUATION MILESTONES: ICP Advanced Surveillance Builds (ASB): ASB-23 Test Event	4	2023	4	2023
TEST and EVALUATION MILESTONES: ICP Advanced Surveillance Builds (ASB): ASB-24 Test Event	4	2024	4	2024
DEVELOPMENT MILESTONES: LFA/CLFA Development: LFA/CLFA OT&E Product Improvement/Upgrade Efforts (Yearly)	1	2018	4	2024
DEVELOPMENT MILESTONES: LFA/CLFA Development: LFA/CLFA Cyber Security Enhancements (Yearly)	1	2018	4	2024
DEVELOPMENT MILESTONES: LFA/CLFA Development: LFA/CLFA Investigate Future Active Systems (T-AGOS(X))	1	2020	4	2024

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 0766 / *IUSS Detect/Classif System*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
DEVELOPMENT MILESTONES: TL-29A Development: TL-29A Develop Telemetry Components (Upgrades) (Yearly)	1	2018	4	2024
DEVELOPMENT MILESTONES: TL-29A Development: TL-29A Develop Fishing Net Mitigation (Yearly)	1	2018	4	2024
DEVELOPMENT MILESTONES: TL-29A Development: TL-29A Fiber Optic Array Tech/ Component Evaluation (Yearly)	1	2018	4	2024
DEVELOPMENT MILESTONES: TL-29A Development: TL-29A Investigate Future Passive Systems (T-AGOS(X))	1	2020	4	2024
DEVELOPMENT MILESTONES: ICP Development: ASB-18 Development	2	2018	1	2019
DEVELOPMENT MILESTONES: ICP Development: ASB-19 Development	2	2019	2	2020
DEVELOPMENT MILESTONES: ICP Development: ASB-20 Development	1	2020	1	2021
DEVELOPMENT MILESTONES: ICP Development: ASB-21 Development	2	2021	2	2022
DEVELOPMENT MILESTONES: ICP Development: ASB-22 Development	4	2022	1	2023
DEVELOPMENT MILESTONES: ICP Development: ASB-23 Development	2	2023	1	2024
DEVELOPMENT MILESTONES: ICP Development: ASB-24 Development	2	2024	4	2024
PRODUCTION MILESTONES: TRAPS/CARINA Fielding: NRE - Reliability Improvement	2	2018	3	2018
PRODUCTION MILESTONES: TRAPS/CARINA Fielding: Addtional Prototype Fabrication	2	2018	4	2018
PRODUCTION MILESTONES: TRAPS/CARINA Fielding: Addtional Prototype Deployment	1	2019	1	2019
PRODUCTION MILESTONES: TRAPS/CARINA Fielding: TASW Hardware Recovery/ Demilitarize	2	2019	3	2019
PRODUCTION MILESTONES: ICP Technology Insertion: ICP Tech Insertion TI-20	1	2019	1	2020
PRODUCTION MILESTONES: ICP Technology Insertion: ICP Tech Insertion TI-22	1	2021	1	2022
PRODUCTION MILESTONES: ICP Technology Insertion: ICP Tech Insertion TI-24	1	2023	1	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204311N / *Integrated Surveillance System*	Project (Number/Name) 1768 / *Ship Plan Development and Design*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1768: *Ship Plan Development and Design*	0.000	0.000	0.000	20.000	-	20.000	17.500	10.000	0.000	0.000	0.000	47.500
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Project 1768 is a new start program.

A. Mission Description and Budget Item Justification

Project 1768 T-ARC(X) is a candidate replacement program for U.S. Navy's only organic undersea cable laying and repair ship, USNS ZEUS (T-ARC 7), which is approaching the end of her extended service life. The ship's main mission is to deploy, repair, and retrieve undersea cables and equipment, with a secondary mission of conducting acoustic, hydrographic and bathymetric surveys.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Ship Concept Development	0.000	0.000	20.000	0.000	20.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: - Begin developing Cable Laying Design, conduct Industry Studies and Request For Proposal (RFP) preparation. - Engineering team begins developing specification and technical data package (TDP). - Develop program documents to support Gate reviews and Interim Program Review (IPR).					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding request in the amount of $20M is the initial funding (NEW START) to begin research and design for a Cable Laying Ship.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	20.000	0.000	20.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 1768 / *Ship Plan Development and Design*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 5080/SCN: *T-ARC Cable Repair Ship*	0.000	0.000	0.000	-	0.000	0.000	305.000	0.000	0.000	0.000	305.000

Remarks

D. Acquisition Strategy

Detail Design and Construction Contract to be awarded in FY22.

E. Performance Metrics

Annual Program Review

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 1768 / *Ship Plan Development and Design*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Industry Studies	TBD	Various : Various	0.000	0.000		0.000		6.000	Aug 2020	-		6.000	18.000	24.000	-
Cable Laying Design	TBD	Various : Various	0.000	0.000		0.000		2.000	Jan 2020	-		2.000	1.000	3.000	-
Engineering Integration/ Design	TBD	Various : Various	0.000	0.000		0.000		5.000	Jan 2020	-		5.000	2.500	7.500	-
		Subtotal	0.000	0.000		0.000		13.000		-		13.000	21.500	34.500	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Requirements Definition	TBD	Various : Various	0.000	0.000		0.000		1.000	Jan 2020	-		1.000	0.000	1.000	-
Spec and TDP development	TBD	Various : Various	0.000	0.000		0.000		4.000	Jan 2020	-		4.000	3.000	7.000	-
Milestone Doc/RFP development	TBD	Various : Various	0.000	0.000		0.000		2.000	Jan 2020	-		2.000	3.000	5.000	-
		Subtotal	0.000	0.000		0.000		7.000		-		7.000	6.000	13.000	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		20.000		-		20.000	27.500	47.500	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 1768 / *Ship Plan Development and Design*

T-ARC Design & Total Ship Integration

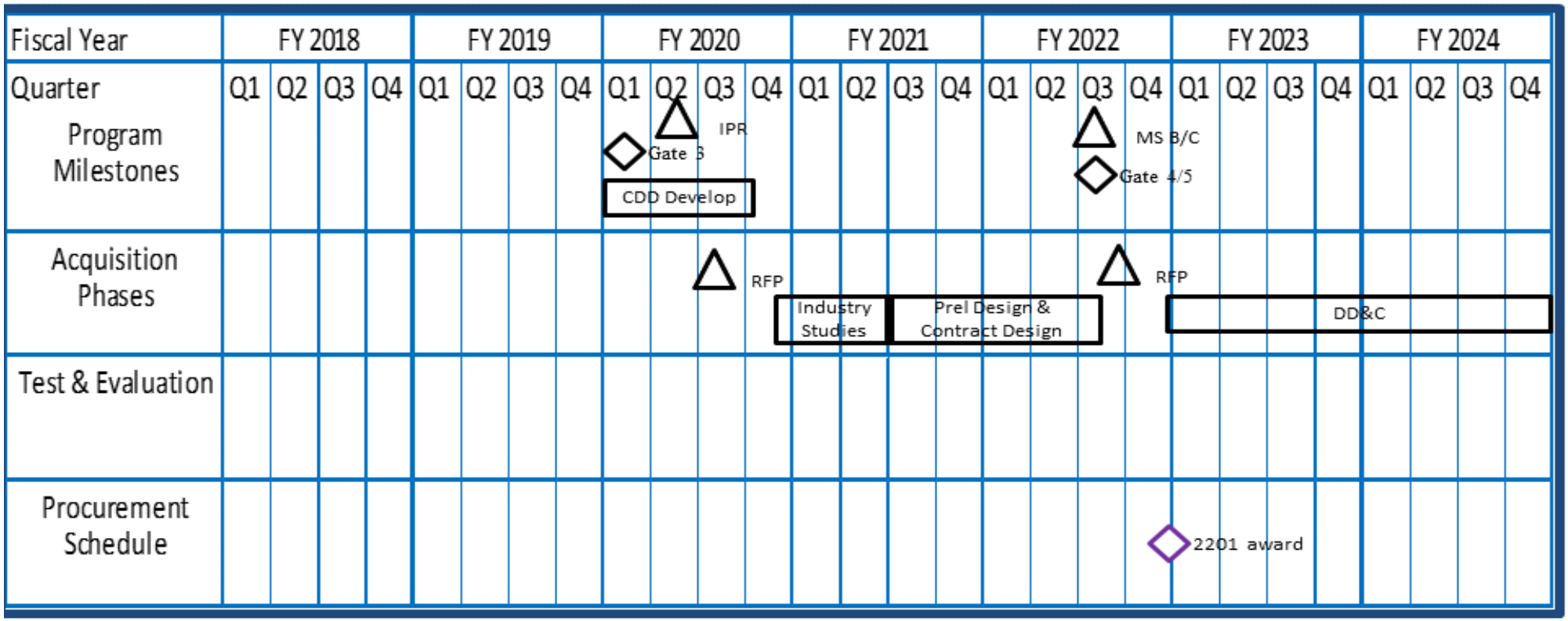


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 1768 / *Ship Plan Development and Design*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1768				
CDD Development	1	2020	4	2020
Gate 3	1	2020	1	2020
Interim Program Review	2	2020	2	2020
Milestone B/C	3	2022	3	2022
Gate 4/5	3	2022	3	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204311N / *Integrated Surveillance System*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	35.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	35.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Navy's Theater Anti-Submarine Warfare (TASW) Offset Strategy responds to an urgent EUROCOM/AFRICOM requirement for additional maritime intelligence, surveillance, and reconnaissance capabilities. PEO SUB, in conjunction with COMSUBFOR and CNO, directed a rapid prototyping program be undertaken utilizing systems developed by the Office of Naval Research (ONR), the Defense Advanced Research Projects Agency (DARPA) and the Naval Undersea Warfare Center (NUWC). Development of TASW capabilities to meet TASW requirements against evolving threats in the EUROCOM/AFRICOM Area of Responsibility (AOR) will also serve to address similar requirements globally. In FY19, Congressional budget additions funded the fourth major prototype contracting, refurbishment, and deployment. This is a Military Intelligence Program (MIP).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Additional TRAPS Units	0.000	35.000
FY 2018 Accomplishments: N/A		
FY 2019 Plans: - Refurbish/repair TASW Offset operational prototypes - Conducted non-recurring engineering to increase prototype reliability - Initiate Deployable Family of Systems (DFoS) tailored Deep Water Passive (DWP) acquisition documentation and contract planning. - Acquire fourth lot of TRAPS (DWP Spiral 1) nodes - Conduct technology risk reduction for DFoS subsystems		
Congressional Adds Subtotals	0.000	35.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

FY 2019: Deep Water Passive (DWP) Spiral 1 Contract Award
FY 2019: DWP Low Rate Initial Production (LRIP) (15 Units)
FY 2019: Software Risk Reduction
FY 2019: C4I Risk Reduction

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 9999 / *Congressional Adds*

E. Performance Metrics

TBD

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204311N / *Integrated Surveillance System*	Project (Number/Name) 9999 / *Congressional Adds*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TASW Fielding	WR	SSC Pacific : CA	0.000	0.000		2.461	May 2019	0.000		-		0.000	0.000	2.461	-
TASW Fielding	WR	NUWC Newport : RI	0.000	0.000		4.100	Feb 2019	0.000		-		0.000	0.000	4.100	-
TASW Fielding	C/CPFF	Leidos : MS	0.000	0.000		24.349	May 2019	0.000		-		0.000	0.000	24.349	-
TASW Fielding	C/CPFF	APL/JHU : MD	0.000	0.000		0.500	Mar 2019	0.000		-		0.000	0.000	0.500	-
TASW Fielding	C/CPFF	Proteq : VA	0.000	0.000		2.400	Jan 2019	0.000		-		0.000	0.000	2.400	-
TASW Fielding	WR	Navy Research Lab : DC	0.000	0.000		0.300	Feb 2019	0.000		-		0.000	0.000	0.300	-
TASW Fielding	C/CPFF	Sandia National Lab : NM	0.000	0.000		0.300	Mar 2019	0.000		-		0.000	0.000	0.300	-
		Subtotal	0.000	0.000		34.410		0.000		-		0.000	0.000	34.410	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TASW Fielding	WR	Navy Oceanographic Office : MS	0.000	0.000		0.150	Feb 2019	0.000		-		0.000	0.000	0.150	-
		Subtotal	0.000	0.000		0.150		0.000		-		0.000	0.000	0.150	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TASW Fielding	WR	Navy Oceanographic Office : MS	0.000	0.000		0.025	Aug 2019	0.000		-		0.000	0.000	0.025	-
		Subtotal	0.000	0.000		0.025		0.000		-		0.000	0.000	0.025	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 9999 / *Congressional Adds*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TASW Fielding	C/CPFF	BAH : VA	0.000	0.000		0.415	Jan 2019	0.000		-		0.000	0.000	0.415	-
		Subtotal	0.000	0.000		0.415		0.000		-		0.000	0.000	0.415	N/A

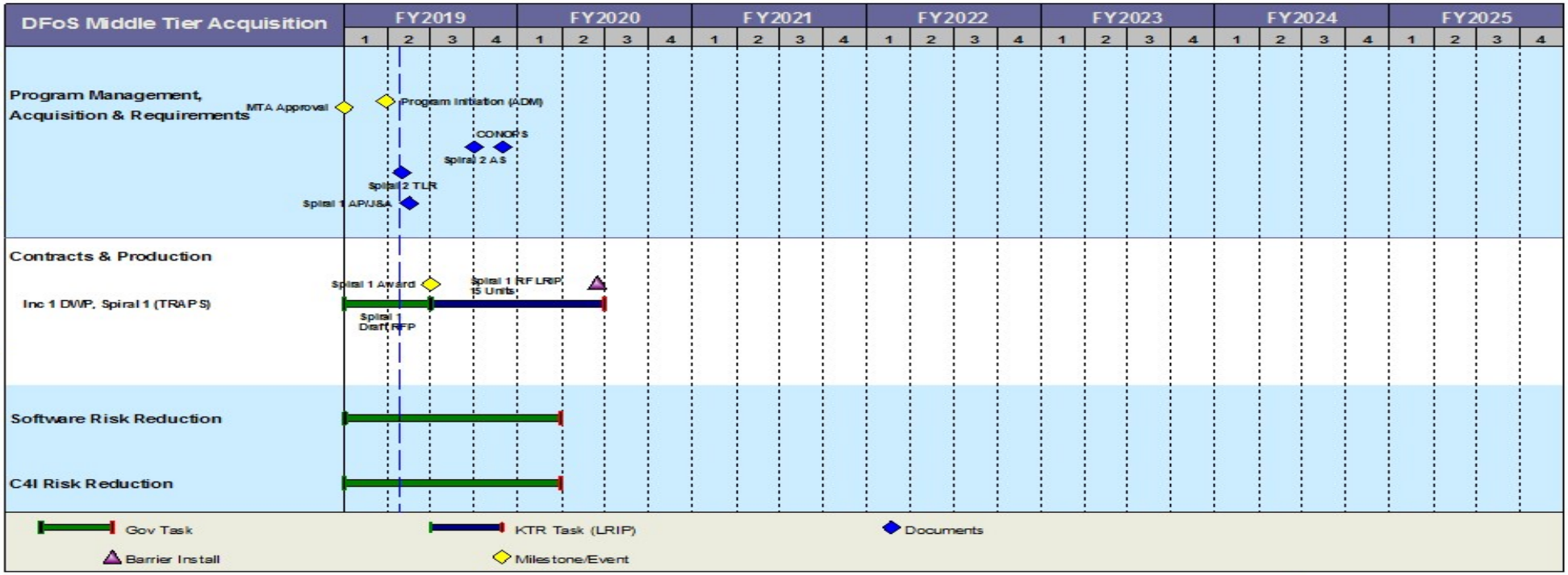
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		35.000		0.000		-		0.000	0.000	35.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 9999 / *Congressional Adds*

UNCLASSIFIED

TASW Offset Schedule



Acquisition Decision Memorandum (ADM)
Acquisition Plan (AP)
Acquisition Strategy (AS)
Concept of Operations (CONOPS)
Deep Water Passive (DWP)
Information Technology Development Strategy (ITDS)
Justification and Approval (J&A)
Low Rate Initial Production (LRIP)
Middle Tier Acquisition (MTA)
Request For Proposal (RFP)
Top-Level Requirements (TLR)
Transformational Reliable Acoustic Path System (TRAPS)

Status Date: 20190129

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204311N / *Integrated Surveillance System*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Production Milestones: Acquisition Documentation: DWP Spiral 1 Contract Award	3	2019	3	2019
Production Milestones: Low Rate Initial Production (LRIP): Low Rate Initial Production	3	2019	3	2020
Production Milestones: Software Risk Reduction: Software Risk Reduction	1	2019	2	2020
Production Milestones: C4I Risk Reduction: C4I Risk Reduction	1	2019	2	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204313N *I SHIP-TOWED ARRAY SURVEILLANCE SYSTEMS*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	15.454	14.449	-	14.449	10.748	6.079	0.000	0.000	0.000	46.730
3261: *TAGOS Design & Total Ship Integration*	0.000	0.000	15.454	14.449	-	14.449	10.748	6.079	0.000	0.000	0.000	46.730

A. Mission Description and Budget Item Justification

This program was previously funded in FY 2018 under Program Element 0603564N (Ship Preliminary Design and Feasibility Studies) Project 3261 (TAGOS Design and Total Ship Integration). This program element continues efforts started under the previous program element and is not a new start. FY20 funding will enable the program to complete Preliminary Design, start contract design and continue industry participation.

T-AGOS Design & Total Ship Integration - Ocean surveillance ships gather underwater acoustical data to support the mission of the Integrated Undersea Surveillance System by
providing a ship platform capable of theater anti-submarine acoustic passive and active surveillance. Auxiliary General Ocean Surveillance Ships (T-AGOS) are operated by Military
Sealift Command to support the anti-submarine warfare mission of the commanders of the Atlantic and Pacific Fleets. The two current classes of surveillance ships use surveillance
towed-array sensor system (SURTASS) equipment to gather undersea acoustic data. The ships also carry electronic equipment to process and transmit that data via satellite to shore
stations for evaluation. Funding will support recapitalization of the four SWATH (T-19 Class) and one SWATH (T-23 Class) Auxiliary General Ocean Surveillance ships (T-AGOS).

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	15.454	14.449	-	14.449
Current President's Budget	0.000	15.454	14.449	-	14.449
Total Adjustments	0.000	0.000	0.000	0.000	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204313N / *SHIP-TOWED ARRAY SURVEILLANCE SYSTEMS*	Project (Number/Name) 3261 / *TAGOS Design & Total Ship Integration*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3261: *TAGOS Design & Total Ship Integration*	0.000	0.000	15.454	14.449	-	14.449	10.748	6.079	0.000	0.000	0.000	46.730
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

T-AGOS Design & Total Ship Integration - Ocean surveillance ships gather underwater acoustical data to support the mission of the Integrated Undersea Surveillance System by
providing a ship platform capable of theater anti-submarine acoustic passive and active surveillance. Auxiliary General Ocean Surveillance Ships (T-AGOS) are operated by Military
Sealift Command to support the anti-submarine warfare mission of the commanders of the Atlantic and Pacific Fleets. The two current classes of surveillance ships use surveillance
towed-array sensor system (SURTASS) equipment to gather undersea acoustic data. The ships also carry electronic equipment to process and transmit that data via satellite to shore
stations for evaluation. Funding will support recapitalization of the four SWATH (T-19 Class) and one SWATH (T-23 Class) Auxiliary General Ocean Surveillance ships (T-AGOS).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: T-AGOS Design	0.000	15.454	14.449	0.000	14.449
Articles:	-	-	-	-	-
FY 2019 Plans: Begin the Navy led Preliminary Design efforts. Continue development of SURTASS interface documentation. Conduct Gate 3 to support submission of the CDD for joint staffing. Develop model to conduct seakeeping and loads tests. Coordinate acquisition efforts with NAVSEA, MSC, PEO SHIPS, CNO, ASN RD&A, OSD, and Fleet.					
FY 2020 Base Plans: Award multiple contracts for industry studies. Complete Preliminary Design, start contract design with industry participation. Start development of Request For Proposals (RFP) documentation for Detail Design and Construction (DD&C) Contract and conduct model testing. Continue to coordinate acquisition efforts with NAVSEA, MSC, PEO SHIPS, CNO, ASN RD&A, OSD, and Fleet.					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204313N / *SHIP-TOWED ARRAY SURVEILLANCE SYSTEMS*	**Project (Number/Name)** 3261 / *TAGOS Design & Total Ship Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 decrease due to design efforts and model development for testing.					
Accomplishments/Planned Programs Subtotals	0.000	15.454	14.449	0.000	14.449

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• SCN/5030: *TAGOS SURTAS SHIPS*	0.000	0.000	0.000	-	0.000	0.000	343.244	369.000	301.980	1,621.276	2,635.500

Remarks

D. Acquisition Strategy

Develop CDD, conduct trade studies and Pre-Preliminary Design in FY18. Start Navy-led Preliminary Design in FY19. Issue RFP for Industry Studies for award of multiple contracts in FY20 to participate in Navy-led Contract Design efforts. Complete Navy-led PD/CD efforts in FY21in order to issue Detail Design and Construction (DD&C) RFP and award to a single shipbuilder in FY22 for DD&C of a Lead Ship with options for up to six Follow-On ships.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204313N / *SHIP-TOWED ARRAY SURVEILLANCE SYSTEMS*	**Project (Number/Name)** 3261 / *TAGOS Design & Total Ship Integration*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Integration/ Design	Various	Various : Various	0.000	0.000		6.155	Jan 2019	5.186	Jan 2020	-		5.186	6.608	17.949	-
Industry Studies (shipyards)	C/FFP	Various : Various	0.000	0.000		0.000		2.000	May 2020	-		2.000	2.000	4.000	-
Model Testing	Various	Various : Various	0.000	0.000		3.700	Jan 2019	2.300	Jan 2020	-		2.300	1.000	7.000	-
SURTASS Integration	Various	Various : Various	0.000	0.000		1.300	Jan 2019	1.000	Jan 2020	-		1.000	1.300	3.600	-
		Subtotal	0.000	0.000		11.155		10.486		-		10.486	10.908	32.549	N/A

Remarks

FY18 funding is in PE 0603564N P/U 3261.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Milestone Doc/RFP Development	Various	Various : Various	0.000	0.000		1.317	Jan 2019	1.174	Jan 2020	-		1.174	2.340	4.831	-
Specification & TDP Development	Various	Various : Various	0.000	0.000		2.052	Jan 2019	1.729	Jan 2020	-		1.729	1.046	4.827	-
Systems Integration (C4I/ Safety/Risk)	Various	Various : Various	0.000	0.000		0.620	Jan 2019	0.640	Jan 2020	-		0.640	1.227	2.487	-
Source Selection Support	Various	Various : Various	0.000	0.000		0.000	Feb 2019	0.100	Feb 2020	-		0.100	0.300	0.400	-
		Subtotal	0.000	0.000		3.989		3.643		-		3.643	4.913	12.545	N/A

Remarks

FY18 funding is in PE 0603564N P/U 3261.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204313N / *SHIP-TOWED ARRAY SURVEILLANCE SYSTEMS*	Project (Number/Name) 3261 / *TAGOS Design & Total Ship Integration*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation Planning	Various	Various : Various	0.000	0.000		0.310	Jan 2019	0.320	Jan 2020	-		0.320	1.007	1.637	-
		Subtotal	0.000	0.000		0.310		0.320		-		0.320	1.007	1.637	N/A

Remarks

FY18 funding is in PE 0603564N P/U 3261.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		15.454		14.449		-		14.449	16.828	46.731	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204313N / *SHIP-TOWED ARRAY SURVEILLANCE SYSTEMS*	**Project (Number/Name)** 3261 / *TAGOS Design & Total Ship Integration*

T-AGOS Design & Total Ship Integration

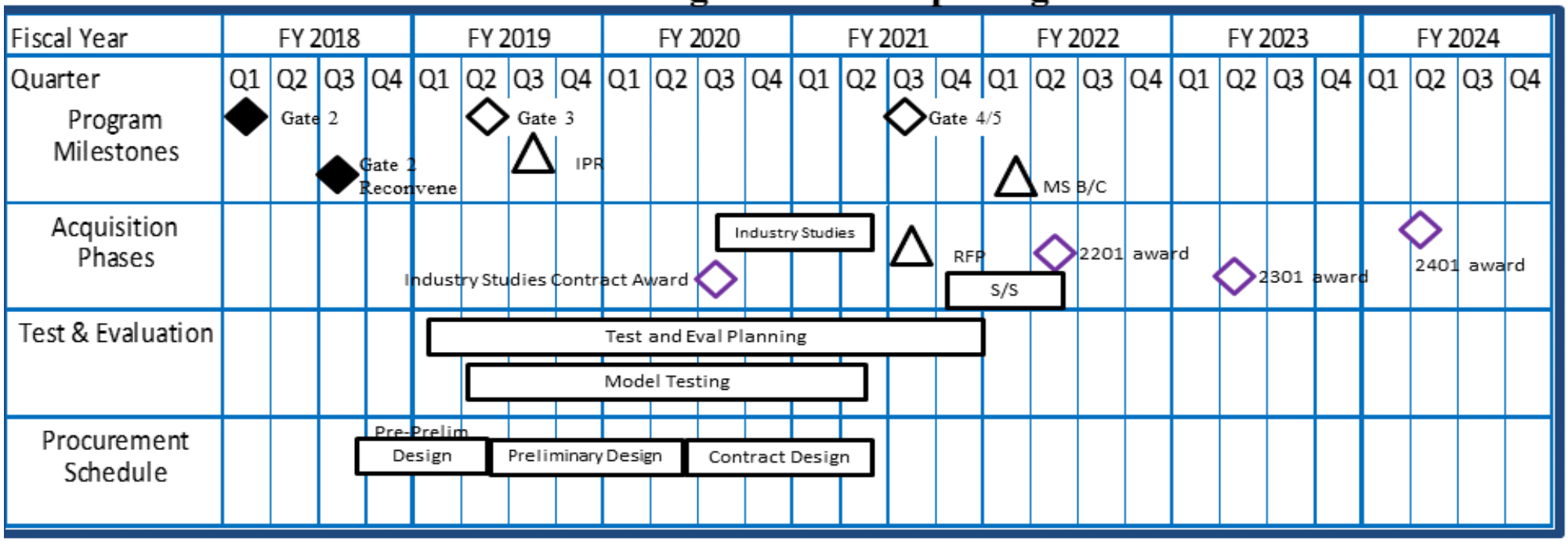

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204313N / *SHIP-TOWED ARRAY SURVEILLANCE SYSTEMS*	**Project (Number/Name)** 3261 / *TAGOS Design & Total Ship Integration*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3261				
Gate 3	2	2019	2	2019
Milestone B/C	1	2022	1	2022
DD&C Award	2	2022	2	2022
Interim Program Review	3	2019	3	2019
Gate 2 reconvene	3	2018	3	2018
GATE 4/5	3	2021	3	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204413N *I Amphibious Tactical Supt Units*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	57.557	2.346	6.073	6.931	-	6.931	3.109	2.310	1.297	1.323	Continuing	Continuing
2231: *LCAC / LCU 1700*	54.868	2.035	1.153	1.061	-	1.061	1.352	1.350	1.297	1.323	Continuing	Continuing
2909: *Amphibious Lighterage Development*	2.689	0.311	4.920	5.870	-	5.870	1.757	0.960	0.000	0.000	0.000	16.507

A. Mission Description and Budget Item Justification

The FY 2020 funding request was reduced by $0.152 million to account for the availability of prior year execution balances.

Landing Craft, Air Cushion (LCAC): Research and development efforts to transfer technologies into functional uses on the current LCACs. Current technology initiatives include sustainability/reliability/readiness/performance analyses, LCAC communication improvements, compliance with Cybersecurity policy regulations, and LCAC Total Ownership Costs (TOC) reduction initiatives.

Landing Craft, Utility (LCU 1700): Replacement program for the current LCU 1610 class craft - a class of craft that has exceeded its 25-year planned service life by nearly double, average age of craft is approaching 50-years-old. LCU 1700 will provide similar payload, range, speed, and interoperability. Detail design contract awarded Q2 FY18.

The Amphibious Support Craft Vehicle (ASCV) which will be the Lighter Amphibious Resupply Cargo, 5 ton (LARC-V) Replacement, provides amphibious equipment and personnel transport as well as near shore salvage and diving capability.

B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	3.940	6.073	7.100	-	7.100
Current President's Budget	2.346	6.073	6.931	-	6.931
Total Adjustments	-1.594	0.000	-0.169	-	-0.169
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.391	0.000			
• SBIR/STTR Transfer	-0.006	0.000			
• Program Adjustments	0.000	0.000	-0.152	-	-0.152
• Rate/Misc Adjustments	0.000	0.000	-0.017	-	-0.017

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0204413N *I Amphibious Tactical Supt Units*			
• Congressional Directed Reductions	-1.979	-	-	-	-
Adjustments					

Change Summary Explanation

The FY 2020 funding request was reduced by $0.152 million to account for the availability of prior year execution balances. Increase in FY 2020 to support the Amphibious Support Craft Vehicle.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204413N / *Amphibious Tactical Supt Units*	Project (Number/Name) 2231 / *LCAC / LCU 1700*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2231: *LCAC / LCU 1700*	54.868	2.035	1.153	1.061	-	1.061	1.352	1.350	1.297	1.323	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Landing Craft, Air Cushion (LCAC): Research and development efforts to transfer technologies into functional uses on the current LCACs. Ongoing technology initiatives include sustainability/reliability/readiness/performance analyses, LCAC communication improvements, Cybersecurity policy regulations compliance, and LCAC Total Ownership Costs (TOC) reduction initiatives.

Landing Craft, Utility (LCU 1700): Replacement program for the current LCU 1610 class craft - a class of craft that has exceeded its 25-year planned service life by nearly double, average age of craft is approaching 50-years-old. LCU 1700 will provide similar payload, range, speed, and interoperability. Detail design contract awarded Q2 FY18.

The FY 2020 funding request was reduced to account for the availability of prior year execution balances.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: LCAC RDT&E,N and LCU 1700	2.035	1.153	1.061	0.000	1.061
Articles:	-	-	-	-	-
FY 2019 Plans: LCAC: - Continue to improve reliability and maintainability of the LCAC HM&E systems. - Complete the technical data package for Windows 10 updates to SBC4 (command and control system) and LCAC Mission Support Systems (LMSS) stations in accordance with DoD directives and Cybersecurity requirements. - Attain Platform IT Risk Management Framework (RMF) accreditation. LCU: - Conduct risk reduction efforts, which support Life Cycle/Total Ownership Cost (TOC) reductions for the class. - Perform Developmental Testing (DT-2). - Complete Platform IT Risk Management Framework (RMF) accreditation. - Continue development of Command, Control, Communications, Computers, and Navigation (C4N) Turnkey Solution.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204413N / *Amphibious Tactical Supt Units*	**Project (Number/Name)** 2231 / *LCAC / LCU 1700*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Commence planning efforts for Operational Testing. ***FY 2020 Base Plans:*** LCAC: - Continue to improve reliability and maintainability of the LCAC HM&E systems. - Maintain compliance with cybersecurity directives and mandates. LCU: - Conduct risk reduction efforts, which support Life Cycle/Total Ownership Cost (TOC) reductions for the class. - Perform Developmental Testing (DT-3 and DT-4). - Continue planning efforts for Operational Testing. - Complete development and commence testing of Command, Control, Communications, Computers, and Navigation (C4N) Turnkey Solution. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request was reduced to account for the availability of prior year execution balances and rate adjustments.					
Accomplishments/Planned Programs Subtotals	2.035	1.153	1.061	0.000	1.061

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN 0970: *LCAC*	5.507	3.709	3.392	-	3.392	6.758	20.889	20.958	21.381	0.000	201.113
• SCN 5139: *LCAC SLEP*	0.000	23.321	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1,443.818
• SCN 5100: *LCU 1700*	0.000	41.520	85.670	-	85.670	89.514	88.708	89.524	91.313	196.412	716.661

Remarks

D. Acquisition Strategy

Multiple contracts and Field Activities are involved to complete the various projects.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204413N / *Amphibious Tactical Supt Units*	**Project (Number/Name)** 2231 / *LCAC / LCU 1700*

E. Performance Metrics

LCAC: Continue to improve the reliability, maintainability, and security of the LCAC.

LCU 1700: Continue risk reduction efforts, update acquisition documentation, and continue IT/OT activities. Establish efforts to improve reliability, maintainability, and security of LCU 1700 as detail design develops.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204413N / *Amphibious Tactical Supt Units*	Project (Number/Name) 2231 / *LCAC / LCU 1700*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LCAC - Component Development	WR	NSWC CD : Philadelphia, PA	8.325	0.000		0.000		0.000		-		0.000	0.000	8.325	-
LCAC - Systems Engineering	WR	NSWC : Various	7.234	0.240	Jan 2018	0.199	Jan 2019	0.244	Jan 2020	-		0.244	Continuing	Continuing	Continuing
LCU - Special Studies	Various	Various : Various	3.840	0.000		0.000		0.000		-		0.000	0.000	3.840	-
LCU - Ship Design	WR	NSWC : Various	17.499	0.959	Jan 2018	0.310	Jan 2019	0.227	Jan 2020	-		0.227	Continuing	Continuing	Continuing
		Subtotal	36.898	1.199		0.509		0.471		-		0.471	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LCAC - Technical Engineering Services	WR	NSWC PCD : Panama City, FL	12.140	0.560	Jan 2018	0.000		0.000		-		0.000	0.000	12.700	-
LCU - Research Studies	Various	Various : Various	0.565	0.000		0.000		0.000		-		0.000	0.000	0.565	-
		Subtotal	12.705	0.560		0.000		0.000		-		0.000	0.000	13.265	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LCAC - Developmental Test & Evaluation	WR	Various : Various	0.287	0.000		0.000		0.000		-		0.000	0.000	0.287	-
LCAC -Operational Test & Evaluation	WR	NSWC PCD : Panama City, FL	2.047	0.000		0.000		0.000		-		0.000	0.000	2.047	-
LCAC - Test Assets	WR	NSWC PCD : Panama City, FL	0.850	0.000		0.000		0.000		-		0.000	0.000	0.850	-
LCU - Developmental Test & Evaluation	WR	OPTEVFOR/ MCOTEA : Norfolk, VA/Quantico, VA	0.000	0.150	Jan 2018	0.358	Jan 2019	0.362	Jan 2020	-		0.362	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204413N / *Amphibious Tactical Supt Units*	Project (Number/Name) 2231 / *LCAC / LCU 1700*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LCU - Operational Test & Evaluation	WR	OPTEVFOR/ MCOTEA : Norfolk, VA/Quantico, VA	0.009	0.076	Jan 2018	0.240	Jan 2019	0.228	Jan 2020	-		0.228	Continuing	Continuing	Continuing
		Subtotal	3.193	0.226		0.598		0.590		-		0.590	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	WR	Various : Various	0.726	0.000		0.000		0.000		-		0.000	0.000	0.726	-
Program Management	WR	NSWC CD : West Bethesda, MD	1.271	0.050	Jan 2018	0.046	Jan 2019	0.000		-		0.000	0.000	1.367	-
Travel	WR	NAVSEA : Not Specified	0.064	0.000		0.000		0.000		-		0.000	0.000	0.064	-
Defense Acquisition Workforce	MIPR	OSD : Not Specified	0.011	0.000		0.000		0.000		-		0.000	0.000	0.011	-
		Subtotal	2.072	0.050		0.046		0.000		-		0.000	0.000	2.168	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	54.868	2.035		1.153		1.061		-		1.061	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204413N / *Amphibious Tactical Supt Units*	**Project (Number/Name)** 2231 / *LCAC / LCU 1700*

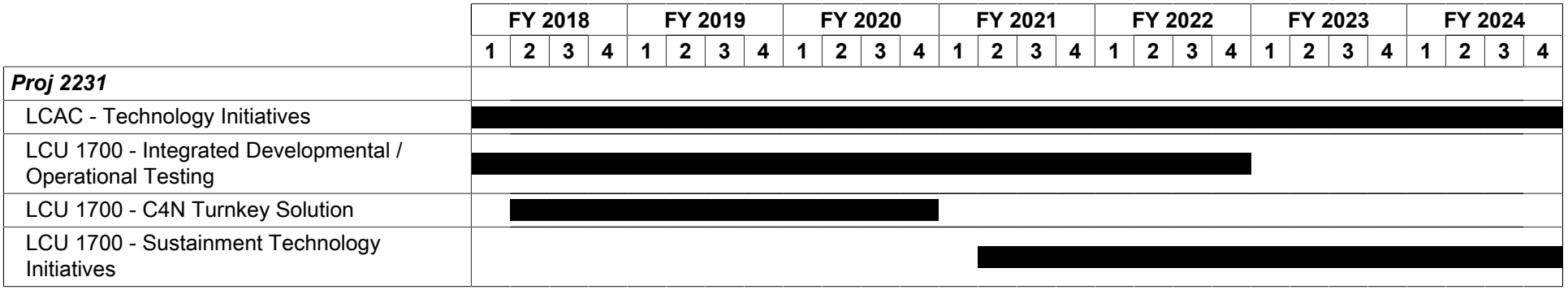

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204413N / *Amphibious Tactical Supt Units*	**Project (Number/Name)** 2231 / *LCAC / LCU 1700*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2231				
LCAC - Technology Initiatives	1	2018	4	2024
LCU 1700 - Integrated Developmental / Operational Testing	1	2018	4	2022
LCU 1700 - C4N Turnkey Solution	2	2018	4	2020
LCU 1700 - Sustainment Technology Initiatives	2	2021	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204413N / *Amphibious Tactical Supt Units*	Project (Number/Name) 2909 / *Amphibious Lighterage Development*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2909: *Amphibious Lighterage Development*	2.689	0.311	4.920	5.870	-	5.870	1.757	0.960	0.000	0.000	0.000	16.507
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Amphibious Support Craft Vehicle (ASCV) which will be the Lighter Amphibious Resupply Cargo, 5 ton (LARC-V) Replacement, provides amphibious equipment and personnel transport as well as near shore salvage and diving capability. It is a vital piece of equipment required for the execution of the Naval Beach Group (NBG) and Underwater Construction Team (UCT) missions.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: LARC-V Replacement	0.311	4.920	5.870	0.000	5.870
Articles:	-	-	-	-	-

FY 2019 Plans:

FY 2019 RDT&E will fund the ASCV acquisition team tasks to include post-Milestone A activities, and refinement of all program documentation required by statute and regulation such as the Acquisition Plan/Acquisition Strategy, Systems Engineering Plan, Test and Evaluation Master Plan, and development of the mission-based test design. These required documents and tasks are the framework by which the eventual prototype vehicle will be evaluated for meeting Key Performance Parameters (KPPs). The development of the prototype vehicle RFP will be initiated during FY 2019. Additionally, it is anticipated that three separate system design contracts will be awarded as part of a down-select process.

FY 2020 Base Plans:

FY 2020 RDT&E will fund the ASCV acquisition team tasks to include pre-Milestone B activities which includes the
Preliminary Design Review (PDR), Independent Logistics Assessment (ILA), final development of the Test and Evaluation Master plan(TEMP), and updates to all pre-Milestone B required documents. The Milestone B review is anticipated for Q3 FY 2020. Immediately after Milestone B approval, the team will focus their efforts on the Detail Design & Construction (DD&C) solication and contract award.

FY 2020 OCO Plans:

N/A

FY 2019 to FY 2020 Increase/Decrease Statement:

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204413N / *Amphibious Tactical Supt Units*	**Project (Number/Name)** 2909 / *Amphibious Lighterage Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The increase from FY 2019 to FY 2020 is attributed to the Preliminary Design Review (PDR), finalization of Pre-Milestone B documentation, and the initiation of the Detailed Design & Construction (DD&C) effort, specifically the solicitation and source selection stages.					
Accomplishments/Planned Programs Subtotals	0.311	4.920	5.870	0.000	5.870

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

RDT&E funding is required to develop a replacement amphibious vehicle to support OPLAN and Required Operational Capability/Potential Operating Environment (ROC/POE) requirements of the Naval Beach Groups and Underwater Construction Teams. Technology investigation began in FY15. Requirements documentation and analysis of alternatives and other such efforts are largely being accomplished with in house resources. Design and initial production efforts will be accomplished via a competitive award contract.

E. Performance Metrics

Quarterly Program Reviews are conducted with the performer to include funds status discussion, schedule review.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204413N / *Amphibious Tactical Supt Units*	**Project (Number/Name)** 2909 / *Amphibious Lighterage Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LARC-V Replacement	WR	Naval Surface Warfare Center Carderock Division (N : West Bethesda, MD	2.689	0.311	Mar 2018	1.920	Mar 2019	5.185	Mar 2020	-		5.185	0.000	10.105	0.200
LARC-V Replacement	Various	EXWC : Port Hueneme, CA	0.000	0.000		3.000	Mar 2019	0.685	Mar 2020	-		0.685	0.000	3.685	-
		Subtotal	2.689	0.311		4.920		5.870		-		5.870	0.000	13.790	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.689	0.311		4.920		5.870		-		5.870	0.000	13.790	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204413N / *Amphibious Tactical Supt Units*	**Project (Number/Name)** 2909 / *Amphibious Lighterage Development*

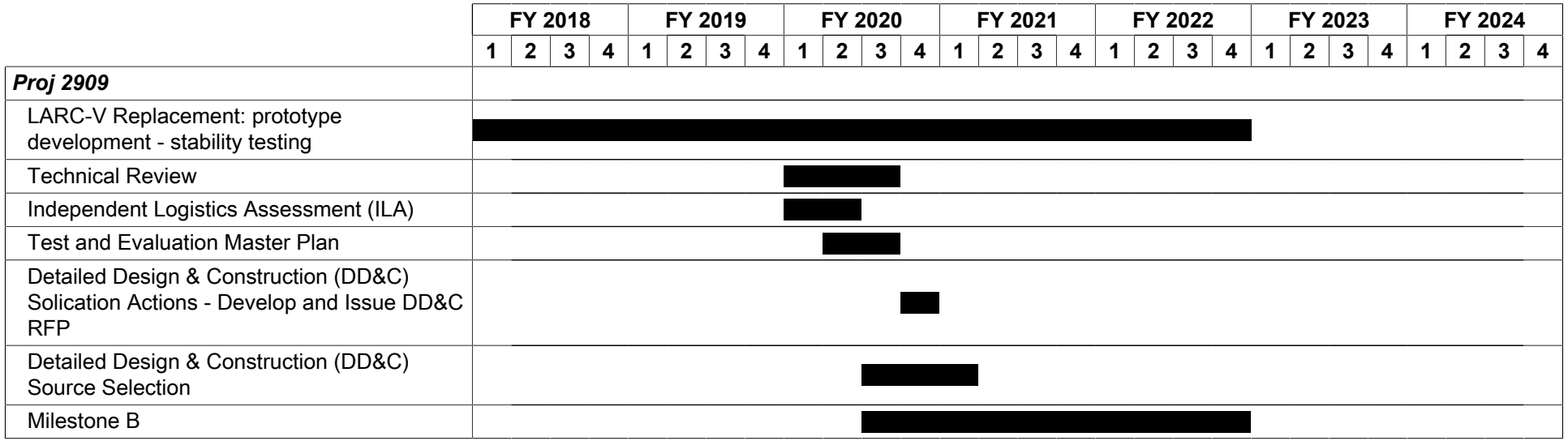

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204413N / *Amphibious Tactical Supt Units*	**Project (Number/Name)** 2909 / *Amphibious Lighterage Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2909				
LARC-V Replacement: prototype development - stability testing	1	2018	4	2022
Technical Review	1	2020	3	2020
Independent Logistics Assessment (ILA)	1	2020	2	2020
Test and Evaluation Master Plan	2	2020	3	2020
Detailed Design & Construction (DD&C) Solication Actions - Develop and Issue DD&C RFP	4	2020	4	2020
Detailed Design & Construction (DD&C) Source Selection	3	2020	1	2021
Milestone B	3	2020	4	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204460M *I (U)Ground/Air Task Oriented Radar (G/ATOR)*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	377.279	53.605	44.579	23.891	-	23.891	10.524	12.176	12.302	12.547	Continuing	Continuing
9C89: *Marine Ground-Air Radar*	377.279	53.605	44.579	23.891	-	23.891	10.524	12.176	12.302	12.547	Continuing	Continuing

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 386

A. Mission Description and Budget Item Justification

The Ground/Air Task Oriented Radar (G/ATOR) is a multi-role, ground-based, expeditionary radar that replaces five legacy radar systems for the Marine Air Ground Task Force. It satisfies the Marine Air Command and Control System (G/ATOR Block 1) and the Ground Counter Fire/Counter Battery (G/ATOR Block 2) capabilities. The G/ATOR replaces the AN/TPS-63 and complements the AN/TPS-59 long range radar and will provide mobile, multi-functional, three-dimensional surveillance of air breathing targets, detection of cruise missiles and UAS, and the cueing of air defense weapons. The G/ATOR contributes to the extension of Sea Shield/Sea Strike by surveillance and detection of enemy air threats not seen by Navy sensors in the littorals by participating in a cooperative engagement network of sensors and shooters. G/ATOR enables Integrated Fire Control (IFC) and provides engage/fire on remote capability. G/ATOR surveillance coverage with IFC will provide unprecedented reach, volume, and precision in the execution of Operational Maneuver From The Sea, allowing Naval forces to project and sustain power deep inland.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	54.645	45.029	23.927	-	23.927
Current President's Budget	53.605	44.579	23.891	-	23.891
Total Adjustments	-1.040	-0.450	-0.036	-	-0.036
• Congressional General Reductions	-	-0.450			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.974	0.000			
• Rate/Misc Adjustments	0.000	0.000	-0.036	-	-0.036
• Congressional General Reductions Adjustments	-0.066	-	-	-	-

Change Summary Explanation

RDT&E funding decreases $20.688M from FY19 to FY20 with the completion of DT1E/IOT&E in FY19.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	Project (Number/Name) 9C89 / *Marine Ground-Air Radar*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9C89: *Marine Ground-Air Radar*	377.279	53.605	44.579	23.891	-	23.891	10.524	12.176	12.302	12.547	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 386

A. Mission Description and Budget Item Justification

The Ground/Air Task Oriented Radar (G/ATOR) is a multi-role, ground-based, expeditionary radar that replaces five legacy radar systems for the Marine Air Ground Task Force. It satisfies the Marine Air Command and Control System (G/ATOR Block 1) and the Ground Counter Fire/Counter Battery (G/ATOR Block 2) capabilities. The G/ATOR replaces the AN/TPS-63 and complements the AN/TPS-59 long range radar and will provide mobile, multi-functional, three-dimensional surveillance of air breathing targets, detection of cruise missiles and Unmanned Aerial Systems (UAS), and the cueing of air defense weapons. The G/ATOR contributes to the extension of Sea Shield/Sea Strike by surveillance and detection of enemy air threats not seen by Navy sensors in the littorals by participating in a cooperative engagement network of sensors and shooters. G/ATOR enables Integrated Fire Control (IFC) and provides an engage/fire on remote capability. G/ATOR surveillance coverage with IFC will provide unprecedented reach, volume, and precision in the execution of Operational Maneuver From The Sea, allowing Naval forces to project and sustain power deep inland.

RDT&E funding decreases $20.688M from FY19 to FY20 with the completion of DT1E/IOT&E in FY19.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: G/ATOR Contractor Technical, Development Engineering/Block 1	16.886	18.305	12.930	0.000	12.930
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue Electronic Protection/Radar Survivability, and Reliability Improvements to include decoys and radar emplacement/displacement time reducing the warfighter's exposure to potential hostile threats in a Peer/Near Peer Competitor Environment. Transition to Production and Producibility Enhancements to include a Processor Tech Refresh and Engineering Change Proposals that address corrective actions identified during DT1D/OA and DT1E/IOT&E testing.					
FY 2020 Base Plans: -Will continue Processor Tech Refresh, Electronic Protection, and Radar Survivability efforts including Decoys. -Will complete radar emplacement/displacement time improvements to reduce the warfighter's exposure to potential hostile threats in a Peer/Near Peer Competitor Environment.					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	**Project (Number/Name)** 9C89 / *Marine Ground-Air Radar*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding decreases $5.375M from FY19 to FY20 as G/ATOR is in FRP while continuing to focus on improvements designed to improve Radar Survivability in a Peer/Near-Peer Competitor environment.					
Title: G/ATOR Contractor Technical, Development Engineering/Block 2 ***Articles:*** ***FY 2019 Plans:*** Funding initiates and completes software development to support a Composite Tracking Network (CTN) interface for the GB2 mission profile that will reduce Warfighter Air Surveillance gaps on the battlefield by providing tracks for both enemy aircraft and unmanned aerial vehicles. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding decreases $6.199M from FY19 to FY20 as the software development portion of a CTN interface for the GB2 mission profile is completed with FY19 funding.	0.000 -	6.199 -	0.000 -	0.000 -	0.000 -
Title: Government Technical Support ***Articles:*** ***Description:*** The Government Technical Support Team provides primarily inherent governmental support functions, including Federally Funded Research and Development Centers (FFRDCs), adding depth, breadth, and expertise not resident in the G/ATOR Program Office. Functions include technical planning as well as execution and analysis across multi-disciplinary competencies to include: Systems Architecture, Radar Software Engineering, Radar Systems Engineering, Radar Decoy Engineering, Cyber Security/Information Assurance, Human Systems Integration, Safety, Program Protection, and Configuration Management. It also includes the coordination necessary to enable a System of Systems interface with other programs in the "Cue to Slew" kill chain such as AC2SN, CTN & AFATDS, ultimately ensuring platform/software compatibility. Technical Team support is vital during the G/ATOR System's Production phase as it is the Government's responsibility to ensure that G/ATOR meets Government Performance Specification Verification.	13.751 -	9.095 -	6.206 -	0.000 -	6.206 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	**Project (Number/Name)** 9C89 / *Marine Ground-Air Radar*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Continue Government support from the following activities to enable program execution: MITRE; NAVAIR; NSWC Dahlgren; NSWC Crane; NSWC Pt Hueneme; NAWC-AD China Lake; NSWC Indian Head; AIMS; NAWCWD Pt Mugu; DTIC; AC2SN PMO Quantico and AMERDEC Redstone Arsenal. ***FY 2020 Base Plans:*** Will continue Government support from the following activities to enable program execution: MITRE; NAVAIR; NSWC Dahlgren; NSWC Crane; NAWC-AD China Lake; NSWC Indian Head; AIMS; NAWCWD Pt Mugu; DTIC and AMERDEC Redstone Arsenal. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Government Technical Support funding decreases $2.889M from FY19 to FY20 as DT1E/IOT&E testing efforts are completed in FY19.					
Title: G/ATOR: Test and Evaluation	22.202	10.690	4.470	0.000	4.470
Articles:	-	-	-	-	-
FY 2019 Plans: Complete DT1E/IOT&E. Perform first DOT&E required engineering test event for Signature Controlled Targets. ***FY 2020 Base Plans:*** Will perform second DOT&E required engineering test event for Signature Controlled Targets. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** T&E funding decreases $6.220M from FY19 to FY20 as DT1E1 and DT1E2 integrated DT/IOT&E test events are completed in FY19.					
Title: G/ATOR: Management Services & Travel	0.766	0.290	0.285	0.000	0.285
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	**Project (Number/Name)** 9C89 / *Marine Ground-Air Radar*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Provide program office travel in support of system development, DT1E/IOT&E, and a DOT&E requested first engineering test event tracking Signature Controlled Targets. ***FY 2020 Base Plans:*** Will provide program office travel in support of system development and a DOT&E requested second engineering test event tracking Signature Controlled Targets. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Travel funding decreases of $0.005M from FY19 to FY20.					
Accomplishments/Planned Programs Subtotals	53.605	44.579	23.891	0.000	23.891

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTE/0604504N/0718: *AIR CONTROL MATCALS*	5.100	5.488	6.648	-	6.648	3.111	2.642	2.683	2.736	Continuing	Continuing
• PMC/7000: *INITIAL SPARES-G/ATOR*	11.417	11.611	13.235	-	13.235	13.506	13.806	14.101	14.383	Continuing	Continuing
• PMC/4655: *GROUND/AIR TASK ORIENTED RADAR*	134.726	220.416	273.022	-	273.022	284.592	298.024	19.307	19.693	58.634	1,644.912

Remarks

D. Acquisition Strategy

The Ground/Air Task Oriented Radar (G/ATOR) is a multi-role, ground-based, expeditionary radar that replaces five legacy radar systems and provides the USMC Air Defense and Air Surveillance (AD/AS) (G/ATOR Block 1), Counterfire/Targeting (G/ATOR Block 2), and Air Traffic Control (G/ATOR Block 4) capability. The AD/AS (GB1) development effort was competitively awarded in 2007 and completed Milestone C in FY14. GB1 achieved Initial Operational Capability (IOC) in February 2018. Development of the Counterfire/Targeting (GB2) capability was initiated in FY10 with a RFI to industry, followed by a Business Case Analysis (BCA) to select the most cost effective procurement strategy. The results of the BCA indicated that a sole source contract to Northrup Grumman Mission Systems (NGMS) was the most cost effective solution. Thus, the GB2 development contract awarded in August FY15. GB2 will achieve IOC in February 2019. A Full Rate Production (FRP) Contract with NGMS is on schedule for award in June 2019 and a Systems Engineering and Logistics Support Contract award is planned in 1QFY20. G/ATOR enhancements include

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	**Project (Number/Name)** 9C89 / *Marine Ground-Air Radar*

a Composite Tracking Network (CTN) for GB2, Processor Tech Refresh, a three-phased Electronic Protection effort, Decoys and Radar Emplacement/Displacement improvements which are all necessary to increase G/ATOR's survivability in a Peer/Near Peer competitor Environment. An LRIP Tech Refresh will upgrade the Gallium Arsenide (GaAS) Transmit and Receive Modules to Gallium Nitride (GaN) in the first six (6) LRIP Radar Systems as well as implement the upgrade of the electronic processors in all fifteen (15) LRIP Radar Systems.

E. Performance Metrics

Earned Value Management
Integrated Master Schedule
OSD Financial Benchmarks
Technical Performance Measures
Reliability: Hardware and Software

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	**Project (Number/Name)** 9C89 / *Marine Ground-Air Radar*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
G/ATOR BLOCK 1 DEVELOPMENT	C/CPIF	NORTHROP GRUMMAN SYSTEMS CORPORATION : LINTHICUM HEIGHTS, MD	184.715	16.886	Dec 2017	18.305	Dec 2018	12.930	Dec 2019	-		12.930	Continuing	Continuing	Continuing
G/ATOR BLOCK 2 SOFTWARE DEVELOPMENT	C/CPFF	NORTHROP GRUMMAN SYSTEMS CORPORATION : LINTHICUM HEIGHTS, MD	60.763	0.000		6.199	Dec 2018	0.000		-		0.000	0.000	66.962	-
		Subtotal	245.478	16.886		24.504		12.930		-		12.930	Continuing	Continuing	N/A

Remarks

Developmental funding decreases $11.574M from FY19 to FY20 as G/ATOR is in Full Rate Production (FRP) while continuing to focus on improvements including Radar Emplacement/Displacement, Processor Tech Refresh, Program/Technology Protection and Radar Survivability efforts all designed to improve Radar Survivability in a Peer, Near-Peer Competitor environment. Award dates reflected are the actual obligation date for the first incremental award. The Northrop Grumman Product Development contract is incrementally funded throughout the fiscal year.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC TECHNICAL SUPPORT	FFRDC	MITRE : BOSTON, MA	5.282	0.726	Dec 2017	0.726	Dec 2018	0.725	Dec 2019	-		0.725	Continuing	Continuing	Continuing
NSWC TECHNICAL SUPPORT	WR	NSWC DAHLGREN : DAHLGREN, VA	38.715	6.425	Dec 2017	2.016	Dec 2018	1.561	Dec 2019	-		1.561	Continuing	Continuing	Continuing
NSWC TECHNICAL SUPPORT	WR	NSWC CRANE : CRANE, IN	1.049	0.276	Dec 2017	0.278	Dec 2018	0.280	Dec 2019	-		0.280	Continuing	Continuing	Continuing
NSWC TECHNICAL SUPPORT	WR	NSWC PHD : DAM NECK, VA	2.920	0.578	Dec 2017	0.000		0.000		-		0.000	0.000	3.498	-
NAVAIR TECHNICAL SUPPORT	WR	NAWC AD : CHINA LAKE, CA	0.055	0.020	Dec 2017	0.020	Dec 2018	0.020	Dec 2019	-		0.020	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	Project (Number/Name) 9C89 / *Marine Ground-Air Radar*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NAVAIR TECHNICAL SUPPORT	WR	NAVAIR : PAX RIVER, MD	1.698	2.761	Dec 2017	1.788	Dec 2018	0.826	Dec 2019	-		0.826	Continuing	Continuing	Continuing
NSWC TECHNICAL SUPPORT	WR	NWSC-IH : INDIAN HEAD, MD	0.623	0.345	Dec 2017	0.350	Dec 2018	0.355	Dec 2019	-		0.355	Continuing	Continuing	Continuing
AIMS TECHNICAL SUPPORT	WR	AIMS : ROBINS AFB, GA	0.250	0.250	Dec 2017	0.255	Dec 2018	0.260	Dec 2019	-		0.260	Continuing	Continuing	Continuing
NAWCWD TECHNICAL SUPPORT	WR	NAWCWD : PT MUGU, CA	0.877	0.675	Dec 2017	0.338	Dec 2018	0.335	Dec 2019	-		0.335	Continuing	Continuing	Continuing
DTIC TECHNICAL SUPPORT	WR	DTIC : FT BELVOIR, VA	0.400	0.280	Dec 2017	0.280	Dec 2018	0.280	Dec 2019	-		0.280	Continuing	Continuing	Continuing
AFATDS TECHNICAL SUPPORT	WR	CECOM : ABERDEEN, MD	0.000	1.415	Dec 2017	0.000		0.000		-		0.000	0.000	1.415	-
AMERDEC TECHNICAL SUPPORT	WR	AMERDEC : REDSTONE ARSENAL , AL	0.000	0.000		1.049	Dec 2018	1.564	Dec 2019	-		1.564	0.000	2.613	-
CTN TECHNICAL SUPPORT	WR	AC2SN PMO PEO LS : QUANTICO, VA	0.000	0.000		1.995	Dec 2018	0.000		-		0.000	0.000	1.995	-
Prior Years Cumulative Funding	Various	N/A : N/A	4.089	0.000		0.000		0.000		-		0.000	0.000	4.089	-
		Subtotal	55.958	13.751		9.095		6.206		-		6.206	Continuing	Continuing	N/A

Remarks

Award dates reflected are the actual obligation date for the first incremental award. Most activities, excluding MITRE are incrementally funded throughout the fiscal year. The ($0.515M) increase in AMERDEC Technical Support completes Radar Decoy Engineering/Technical Services supporting Radar Survivability in a Peer, Near-Peer environment.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PRIME CONTRACTOR TEST SUPPORT	C/CPIF	NORTHROP GRUMMAN SYSTEMS CORPORATION :	8.551	4.102	Dec 2017	1.876	Dec 2018	0.866	Dec 2019	-		0.866	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	Project (Number/Name) 9C89 / *Marine Ground-Air Radar*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		LINTHICUM HEIGHTS, MD													
TEST SUPPORT	WR	NSWC DAHLGREN : DAHLGREN, VA	5.338	3.416	Dec 2017	2.404	Dec 2018	0.932	Dec 2019	-		0.932	Continuing	Continuing	Continuing
TEST SUPPORT	WR	AC2SN PEO LS : QUANTICO, VA	1.623	0.595	Dec 2017	0.235	Dec 2018	0.000		-		0.000	0.000	2.453	-
TEST SUPPORT	MIPR	JTIC : FT HUACHUCA, AZ	0.310	0.117	Dec 2017	0.120	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing
TEST PLANNING/ SUPPORT	Various	NSWC-FALLBROOK : CRANE, IN	7.109	1.844	Dec 2017	0.478	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing
TEST EVALUATION SUPPORT	C/CPIF	MCOTEA : QUANTICO, VA	1.960	0.107	Dec 2017	0.000		0.000		-		0.000	0.000	2.067	-
TEST SUPPORT	Various	NSWC CORONA : CORONA, CA	3.758	1.540	Dec 2017	0.514	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing
TEST PLANNING/ SUPPORT	Various	NSWC PHD : DAM NECK, VA	6.732	1.926	Dec 2017	0.645	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing
TEST ASSET PROCUREMENT	C/CPFF	MCSC : QUANTICO, VA	11.890	1.019	Dec 2017	0.000		0.000		-		0.000	0.000	12.909	-
TEST PLANNING/ SUPPORT	WR	JSF PMO : WASHINGTON , DC	0.000	0.770	Dec 2017	0.675	Dec 2018	0.580	Dec 2019	-		0.580	Continuing	Continuing	Continuing
TEST PLANNING/ SUPPORT	WR	NAWCWD : PT MUGU, CA	0.000	0.343	Dec 2017	0.251	Dec 2018	0.159	Dec 2019	-		0.159	Continuing	Continuing	Continuing
TEST PLANNING/ SUPPORT	WR	NAVSEA/PMR-51 : WASHINGTON, DC	0.000	0.540	Dec 2017	0.452	Dec 2018	0.364	Dec 2019	-		0.364	Continuing	Continuing	Continuing
TEST PLANNING/ SUPPORT	WR	NAVAIR : PAX RIVER, MD	0.000	0.766	Dec 2017	0.676	Dec 2018	0.574	Dec 2019	-		0.574	Continuing	Continuing	Continuing
TEST OPERATOR SUPPORT	Various	MARFOR : Various	1.182	0.250	Dec 2017	0.175	Dec 2018	0.100	Dec 2019	-		0.100	Continuing	Continuing	Continuing
TEST RANGE SUPPORT	WR	YPG : YUMA, AZ	0.991	1.390	Dec 2017	0.695	Dec 2018	0.000		-		0.000	0.000	3.076	-
TEST RANGE SUPPORT	WR	NAWCWD : PT MUGU, CA	0.000	1.765	Dec 2017	0.784	Dec 2018	0.895	Dec 2019	-		0.895	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TEST FACILITY SUPPORT	WR	SCSC : WALLOPS IS, MD	0.465	0.372	Dec 2017	0.000		0.000		-		0.000	0.000	0.837	-
TEST FACILITY SUPPORT	WR	MCAS YUMA : YUMA, AZ	0.810	0.825	Dec 2017	0.420	Dec 2018	0.000		-		0.000	0.000	2.055	-
TEST FACILITY SUPPORT	WR	MCB 29 PALMS : 29 PALMS, CA	0.000	0.515	Dec 2017	0.290	Dec 2018	0.000		-		0.000	0.000	0.805	-
Prior Years Cumulative Funding	Various	N/A : N/A	12.622	0.000		0.000		0.000		-		0.000	0.000	12.622	-
		Subtotal	63.341	22.202		10.690		4.470		-		4.470	Continuing	Continuing	N/A

Remarks

Award dates reflected are the actual obligation date for the first incremental award. T&E funding decreases $6.220M from FY19 to FY20 as DT1E1 and DT1E2 integrated DT/IOT&E test events are completed in FY19. The ($0.111M) increase in Test Range Support at Pt Mugu is for the second more in-depth DOT&E requested test event tracking Signature Controlled Targets.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MANAGEMENT SERVICES	C/FP	MCSC : MCSC - QUANTICO, VA	11.077	0.471	Nov 2017	0.000		0.000		-		0.000	0.000	11.548	-
TRAVEL	Various	MCSC : QUANTICO, VA	1.425	0.295	Sep 2018	0.290	Sep 2019	0.285	Sep 2020	-		0.285	Continuing	Continuing	Continuing
		Subtotal	12.502	0.766		0.290		0.285		-		0.285	Continuing	Continuing	N/A

Remarks

The funding decreases of $0.005M from FY19 to FY20.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	377.279	53.605		44.579		23.891		-		23.891	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

RDT&E funding decreases $21.087M throughout the total G/ATOR program from FY19 to FY20 with the completion of DT1E/IOT&E in FY19.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	**Project (Number/Name)** 9C89 / *Marine Ground-Air Radar*

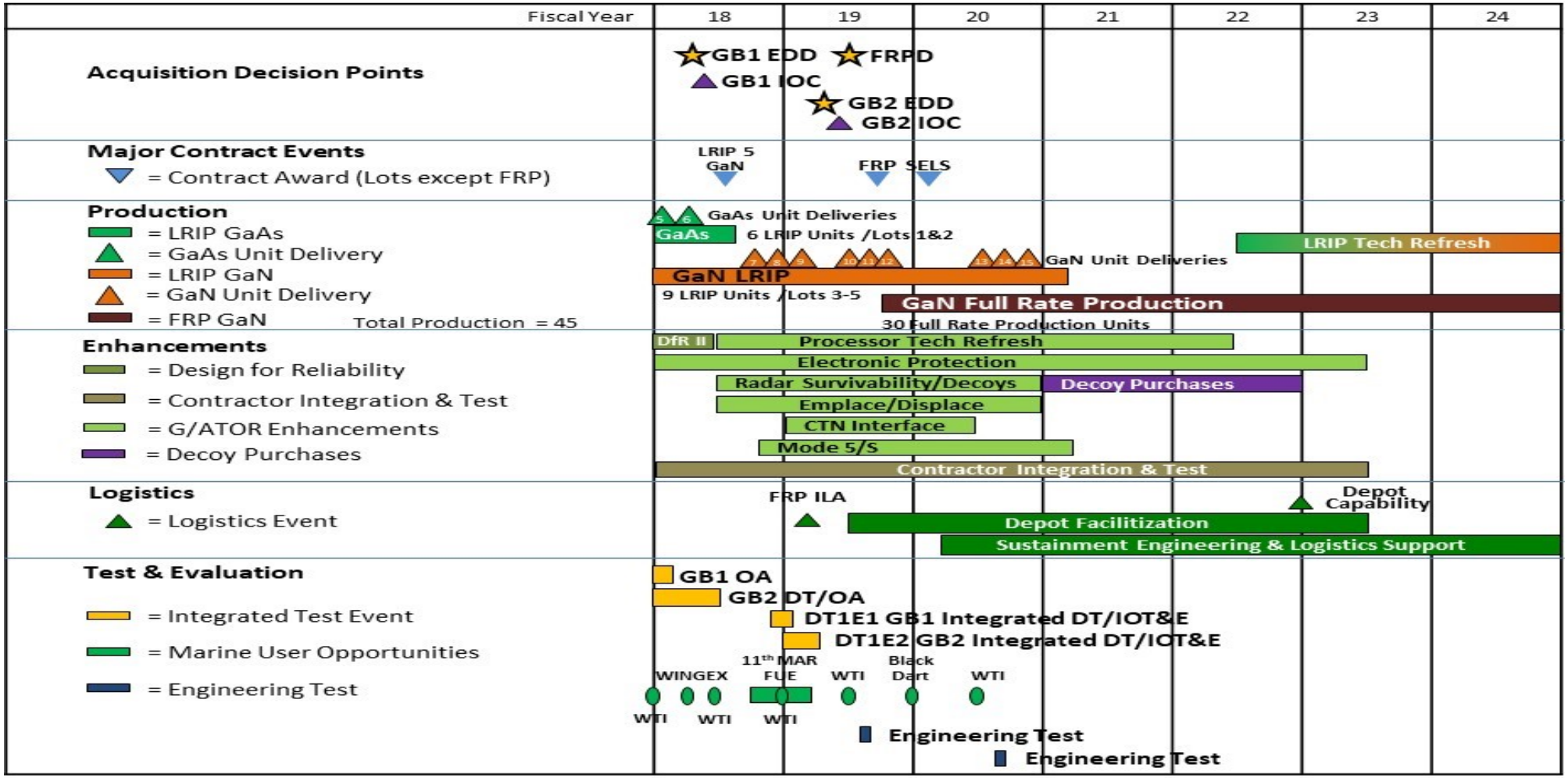

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	**Project (Number/Name)** 9C89 / *Marine Ground-Air Radar*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9C89				
Gallium Arsenide (GaAs) Radar: GB1 Operational Assessment (OA)	1	2018	1	2018
Gallium Arsenide (GaAs) Radar: GB1 Radar IOC	2	2018	2	2018
Gallium Arsenide (GaAs) Radar: LRIP Tech Refresh	3	2022	4	2024
Gallium Nitride (GaN) Radar: DT1E1 GB1 Integrated DT/IOT&E	4	2018	1	2019
Gallium Nitride (GaN) Radar: DT1E2 GB2 Integrated DT/IOT&E	4	2018	1	2019
Gallium Nitride (GaN) Radar: LRIP Lot 5 Contract Award	2	2018	2	2018
Gallium Nitride (GaN) Radar: FRPD	3	2019	3	2019
Gallium Nitride (GaN) Radar: FRP	3	2019	4	2024
Gallium Nitride (GaN) Radar: DOT&E Engineering Test 1	3	2019	3	2019
Gallium Nitride (GaN) Radar: DOT&E Engineering Test 2	3	2020	3	2020
Gallium Nitride (GaN) Radar: LRIP Tech Refresh	3	2022	4	2024
Ground Weapons Locating Radar (GWLR): GB2 Developmental Test (DT1D)	1	2018	1	2018
Ground Weapons Locating Radar (GWLR): GB2 Operatonal Assessment (OA)	2	2018	3	2018
Ground Weapons Locating Radar (GWLR): 11th Marines Field User Evaluation (FUE)	4	2018	2	2019
Ground Weapons Locating Radar (GWLR): GB2 IOC	2	2019	2	2019
Enhancements: Design for Reliability II	1	2018	2	2018
Enhancements: Electronic Protection	1	2018	2	2023
Enhancements: Radar Survivability/Decoys	3	2018	4	2020
Enhancements: Decoy Purchases	1	2021	4	2022
Enhancements: Processor Tech Refresh	3	2018	2	2022
Enhancements: Emplacement/Displacement	3	2018	4	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204460M / *(U)Ground/Air Task Oriented Radar (G/ATOR)*	**Project (Number/Name)** 9C89 / *Marine Ground-Air Radar*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Enhancements: CTN Interface	1	2019	2	2020
Enhancements: Mode 5/S	4	2018	1	2021
Logistics: FRP ILA	1	2019	1	2019
Logistics: Depot Facilitzation (LRU Repair & IROAN)	3	2019	2	2023
Logistics: Sustainment Engineering and Logisctics Support Contract Award	1	2020	1	2020
Logistics: Sustainment Engineering and Logisctics Support	1	2020	4	2024
Logistics: Depot IROAN Capability	4	2022	4	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204571N *I Consolidated Trng Sys Dev*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	441.349	64.585	104.903	129.873	-	129.873	64.931	46.068	28.351	25.673	Continuing	Continuing
0604: *Training Range & Instr Dev*	151.767	0.003	4.238	5.574	-	5.574	3.554	3.632	3.697	3.769	Continuing	Continuing
1427: *Surface Tactical Team Trainer (STTT)*	119.025	15.081	42.046	67.790	-	67.790	51.628	37.067	19.183	16.325	Continuing	Continuing
2124: *Air Warfare Training*	49.516	1.558	1.709	1.700	-	1.700	1.614	1.647	1.679	1.712	Continuing	Continuing
3093: *TACTS/LATR Replacement*	93.570	46.780	56.154	51.245	-	51.245	6.669	3.722	3.792	3.867	Continuing	Continuing
3356: *High Fidelity Surface Trainers*	27.471	1.163	0.756	3.564	-	3.564	1.466	0.000	0.000	0.000	0.000	34.420

A. Mission Description and Budget Item Justification

0604 - Training Range and Instrumentation Development project develops specialized instrumentations for fleet readiness training while minimizing life cycle costs. Tasks include development of the following: Large Area Tracking Range (LATR) improvements, technology improvements for fixed and portable Anti-Submarine Warfare training ranges, and Tactical Training Range (TTR) infrastructure improvements to include: Joint Display Subsystem, Radar Acquisition Display Subsystem, Electronic Warfare server, Link 16 interface, TTR Rotary Wing Tracking System technology improvements, Radiant Mercury Cross Domain Solution and Smart Antenna technology for automated frequency deconfliction.

1427 - Surface Tactical Team Trainer (STTT) develops modifications during sustainment of Battle Force Tactical Training (BFTT) system and modernization into the Advanced Training Domain (ATD). Both BFTT and ATD are the core system that is used to integrate the weapon system elements, and combat system components to create the Total Ship Training Capability (TSTC). BFTT and ATD continue to integrate and update, as new tactical capabilities are being introduced, to enable crew operator proficiency training for basic and sustainment level training events, through distributed strike group certification fleet synthetic training (FST) events and including COMPTUEX FST at Sea integration into Live, Virtual and Constructive (LVC) environment. Continued Development is required to integrate new capabilities and interfaces to provide training for AEGIS and SSDS combat system capability upgrades, and to address the Fleet's Live, Virtual and Constructive (LVC) Fleet Training Wholeness initiative. Additionally, modernization is needed to support the DoD Training Transformation Plan, the Chief of Naval Operations Fleet Response Plan.

2124 - - Air Warfare Training Development (AWTD) provides for risk mitigation and next generation platform, Unmanned Aerial Systems (UAS), Live Virtual Constructive (LVC) and associated visualization component development for distributed mission training, and for stand-alone and small footprint deployable devices. Supports the Navy Aviation Simulation Master Plan (NASMP) upgrade efforts and Type/Model/Series programs with advanced visual system display configurations requirements. Provides for Open Architecture (OA), and common systems interface applications. Assesses trainee cognitive requirements and the development and incorporation of next generation LVC, UAS constructive and associated visualization component technologies. Additionally, AWTD provides for advanced virtual component fidelity

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204571N *I Consolidated Trng Sys Dev*

improvements for LVC capability which includes the "Mobility" Part-Task Trainers and the Multiplex Data Bus Controller Translator Transmitter enabling technologies. LVC technologies will facilitate advanced, cost effective weapons and tactics training and emerging capability requirements in the Air-Sea Battle Space and Naval Integrated Fire Control-Counter Air capabilities development. AWTD investigates training applications of emerging technologies such as Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR) Head Mounted Displays (HMD), haptic feedback devices, and cross domain solutions/ cybersecurity solutions (e.g., Blockchain technology).

3093 - The Tactical Combat Training System (TCTS) Increment II will provide an improved environment for air combat training utilizing a secure air-to-air and air-to-ground data link, and will provide rangeless operation capability to Forward Deployed Naval Forces (FDNF). TCTS Increment II will provide encryption and an enhanced threat environment, as well as airborne participant instrumentation for multiple fixed and rotary wing platforms. Engineering Development Model (EDM) units will be developed in FY19 and FY20 and will support Engineering and Developmental Testing events thru FY21. The EDMs will be specifically utilized for testing in the following areas: Environmental Qualification, Software, High Accelerated Lifecycle, Ground System Integration, Airborne Subsystem Air Worthiness and Performance, Shipboard Ground Station, Internal Mount and Rack Mounted Subsystem (Internal Mount) Airworthiness and Performance and JSF Airworthiness and Performance.

3356- Funds high fidelity Aegis Integrated Air and Missile Defense (IAMD) individual, instructor, strike group and team trainers for all Advanced Capability Build (ACB) and below Aegis baselines. This line also provides funds for the research and development of enabling technologies required to meet Train to Qualify (T2Q) and Train to Certify (T2C) requirements for the Vertical Takeoff Unmanned Aerial Vehicle (VTUAV) and testing towards the integration with the Littoral Combat Ships (LCS) Integrated Tactical Trainers. This line also provides funds for research and development of updates to the Surface Navigation Maintenance Technician Training course of instruction. This line supports Surface Training Advanced Virtual Environment (STAVE) methodology by researching and developing trainers that will create an immersive and interactive learning environment and support both CNO High Velocity Learning and Ready Relevant Learning intent. NOTE: In FY18, Mine Warfare Synthetic Training requirements previously captured within PE 0204571N / Project 3356 [(High Fidelity Surface Trainer)] were realigned to PE 0603502N / Project 1235 [(Mine Warfare Planning and Analysis)].

JUSTIFICATON FOR BUDGET ACTIVITY:
This program is funded under Operational Systems Development because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
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B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	66.518	104.903	101.388	-	101.388
Current President's Budget	64.585	104.903	129.873	-	129.873
Total Adjustments	-1.933	0.000	28.485	-	28.485
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.933	0.000			
• Program Adjustments	0.000	0.000	28.486	-	28.486
• Rate/Misc Adjustments	0.000	0.000	-0.001	-	-0.001

Change Summary Explanation

2124:

Human Systems Integration: Updated title of Augmented Reality OFT Demo to AR/VR/MR Sim Demo and extended end date from 4Q19 to 4Q21. Updated Crew Enabled Role Player start date from 1Q19 to 1Q18 and end date from 4Q23 to 4Q24. Updated T-45 ARVS PTT end date from 2Q19 to 3Q19. Updated Augmented Reality OFT Demo milestone name to AR/VR/MR Sim Demo I. Added AR/VR/MR Sim Demo 2 milestone in 4Q2020. Added AR/VR/MR Sim Demo 3 milestone in 4Q21. Added Crew Enabled Role Player - Phase IV milestone in 4Q24. Added T-45 ARVS PTT 2 milestone in 2Q19. Added T-45 ARVS PTT 3 milestone in 3Q19.

Sensors and Environment: Updated Common/Platform Sensors and Environment (Models/Tools) end date from 4Q19 to 4Q20. Updated Collaborative Database Rapid Terrain Generation end date from 4Q23 to 4Q24. Updated Near Eye Display Metrology System end date from 4Q19 to 4Q20. Updated VR and Haptic for Flight Deck Crew Demo end date from 4Q20 to 4Q22. Added Fused Sensors USA/Tier 5 milestone in 4Q20. Added Collaborative Database Rapid Generation Phase IV milestone in 4Q24. Updated Near Eye Display Metrology System milestone from 4Q19 to 4Q20. Added VR and Haptic for Flight Deck Crew Demo II milestone in 4Q21. Added VR and Haptic for Flight Deck Crew Demo III milestone in 4Q22.

Live/Virtual/Constructive: Added Embedded NGTS for TCTS Participant Subsystem starting 1Q19 and ending 4Q19. Added NIFC-CA Virtual Adaptive Training Technology starting 1Q18 ending 4Q20. Updated Flight Deck Trainer Expansion pack start date from 1Q19 to 1Q18 and end date from 4Q23 to 4Q24. Added Fleet Adaptive Multi-Level Measurement for LVD starting 4Q18 ending 4Q23. Deleted Virtual/Constructive Mission Rehearsal milestone 4Q18. Deleted LVC Persistent Capability Demo milestone 4Q18. Added Embedded NGTS for TCTS PS milestone 1Q19. Added Embedded NGTS for TCTS PS 2 milestone 3Q19. Added NIFC-CA Adaptive Training Tech I milestone 4Q19. Added NIFC-CA Adaptive Training Tech II milestone 4Q20. Added Fleet Adaptive Multi-Level Measurement for LVC Phase 1 milestone 3Q19. Added Fleet Adaptive Multi-Level Measurement for LVC Phase 2 milestone 3Q20. Added Fleet Adaptive Multi-

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
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Level Measurement for LVC Phase 3 milestone 3Q21. Added Fleet Adaptive Multi-Level Measurement for LVC Phase 4 milestone 3Q22. Added Fleet Adaptive Multi-Level Measurement for LVC Phase 5 milestone 4Q23.

3093:
TACTS/LATR Replacement: Post Preliminary Design Review (PDR) Assessment moved from 2QTR 2018 to 4QTR 2018. Post Critical Design Review (CDR) Assessment moved from 1QTR 2019 to 2QTR 2019. Encryption Milestone C moved from 1QTR 2020 to 2QTR 2021. LRIP for Airborne Subsystem (POD), Ground Subsystem, Remote Range Unit, Portable Support Equipment Subsystem will now run from 2QTR 2021 through 2QTR 2022. The Production Decision for the Internal Mounts moved from 1QTR 2021 to 1QTR 2022 with the Low rate initial production (LRIP) for the Internal Mounts beginning in 1QTR 2022 and running through 2QTR 2023. Initial operational capability (IOC) for Airborne Subsystem (POD), Ground Subsystem, Remote Range Unit, and Portable Support Equipment Subsystem moved from 2QTR 2021 to 2QTR 2022 and IOC for the Internal Mounts will occur in 2QTR 2023. Full-Rate Production (FRP) was moved from 1QTR 2023 to 2QTR 2023. Authority to Operate (ATO) moved from 3QTR 2019 to 3QTR 2020. Test Readiness Review / Flight Readiness Review / Functional Configuration Audit moved from 2QTR 2019 to 1QTR 2020 and will run through 1QTR 2022. Developmental Test-B was moved from 2QTR 2019 to 1QTR 2020 and will run through 4 QTR 2021. Developmental Test C was moved from 1QTR 2020 to 2QTR 2022 and will now run through 2QTR 2023. National Security Agency (NSA) certification events will now run through 2QTR 2021.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204571N / *Consolidated Trng Sys Dev*	Project (Number/Name) 0604 / *Training Range & Instr Dev*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0604: *Training Range & Instr Dev*	151.767	0.003	4.238	5.574	-	5.574	3.554	3.632	3.697	3.769	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Training Range and Instrumentation Development project develops specialized instrumentations for fleet readiness training while minimizing life cycle costs. Tasks include development of the following: Large Area Tracking Range (LATR) improvements, technology improvements for fixed and portable Anti-Submarine Warfare training ranges, and Tactical Training Range (TTR) infrastructure improvements to include: Joint Display Subsystem, Radar Acquisition Display Subsystem, Electronic Warfare server, Link 16 interface, TTR Rotary Wing Tracking System technology improvements, Radiant Mercury Cross Domain Solution and Smart Antenna technology for automated frequency deconfliction. FY19 to FY20 funding increase represents support to planned LATR, TTR and Ocean System development programs. It also includes increased funding of $1.135M for Smart Antenna development.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: LATR	0.003	2.416	2.877	0.000	2.877
Articles:	-	-	-	-	-
Description: Design, integrate and test modules to eliminate obsolete components in the Large Area Tracking Range (LATR) Pod. Design, integrate and test LATR software baseline upgrades. Design, integrate and test Participant Instrumentation Packages (PIP) modules to address obsolescence, high failure components and to improve operability and performance. Conduct and complete installation of the Ground System Rehosts. Conduct and complete security testing and assessment for LATR system certification and accreditation for Ground System Rehosts. Develop, test and integrate software and hardware modifications to system test sets. Develop, test and integrate LATR data translators. Conduct studies to identify sub-projects required through FY24. Complete ground system and PIP refresh sub-projects, in conjunction with, semi-annual system block upgrades. Conduct LATR Operational Security (OPSEC) Posture Improvements Sub-Project, Shipboard and Rotary Wing Technology Wing Upgrade (LSRTU) and LATR Navigation Technology Refresh (LNTR).					
FY 2019 Plans: Develop and test Large Area Tracking Range (LATR) ground software 6.4 changes to incorporate Live Virtual Constructive (LVC) Technology. Continue to develop operational system improvements and solutions to eliminate LATR obsolescence issues.					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 0604 / *Training Range & Instr Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Develop and test Large Area Tracking Range (LATR) ground software 6.5 changes to incorporate Live Virtual Constructive (LVC) Technology. Continue to develop operational system improvements and solutions to reduce LATR obsolescence issues. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $.461 from FY 2019 to FY 2020 represents funds required to develop operational system improvements and solutions to reduce LATR obsolescence issues as the system reaches the end of its service life.					
Title: TTR	0.000	1.232	2.034	0.000	2.034
Articles:	-	-	-	-	-
Description: Develop and test upgrades to the Joint Display Subsystem (JDS), Radar Acquisition Display Subsystem (RADS), and Electronic Warfare (EW) server. Develop and test upgrades to the Link-16 Interface, JDS, RADS, and EW server. Develop and test Smart Antenna technology for automated frequency deconfliction. Disruptions and limitations in the Live-to-Virtual (LV) tactical radio communication segment of the Navy Continuous Training Environment (NCTE) network have interfered with the goals and objectives of Fleet Synthetic Training (FST) events. The Smart Antenna improves utilization of the frequency spectrum in the relay tower by performing calculations to predict RF interference and then avoid RF interference by assigning interfering frequency pairs to antenna pairs with greater isolation, thereby deconflicting frequencies. ***FY 2019 Plans:*** Develop and test 2019.1 upgrades to the Joint Display Subsystem (JDS), Radar Acquisition Display Subsystem (RADS), and Electronic Warfare (EW) server to remain in concert with evolving threat and tactical training requirements. Develop operational systems improvements to the Rotary Wing Tracking System. Develop and test Tactical Training Ranges (TTR) ground software changes to incorporate Live, Virtual and Constructive (LVC) technology. Develop detailed Smart Antenna architecture including interfaces. Develop exploratory software code to test architecture. ***FY 2020 Base Plans:*** Develop and test 2020.1 upgrades to the Joint Display Subsystem (JDS), Radar Acquisition Display Subsystem (RADS), and Electronic Warfare (EW) server to remain in concert with evolving threat and tactical training requirements. Develop operational systems improvements to the Rotary Wing Tracking System. Develop and test Tactical Training Ranges (TTR) ground software changes to incorporate Live, Virtual and Constructive					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 0604 / *Training Range & Instr Dev*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
(LVC) technology. Integrate, test & deliver Smart Antenna deconfliction software and Technical Data Package. Demonstrate Smart Antenna technology during a LVC event. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $.802 from FY 2019 to FY 2020 represents the additional funding required to integrate, test & deliver Smart Antenna deconfliction software and Technical Data Package.					
Title: Ocean Systems ***Articles:*** ***Description:*** Research, develop, and test technology improvements for fixed and portable Anti-Submarine Warfare (ASW) training ranges. ***FY 2019 Plans:*** Complete a gap analysis between Sea Raven Display and Control Subsystem (DCS) and other DCS systems. Document the requirements identified by the gaps and develop a Product Line approach for Sea Raven. Develop a plan for sun-setting Naval Gunfire Scoring System (NGSS) and Navy Tracking and Display Software (NTADs). ***FY 2020 Base Plans:*** To complete and deliver Phase 4 of the Next Generation Technology Development at various Anti-Submarine Warfare (ASW) training ranges. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $.073 from FY 2019 to FY 2020 due to requirements for Phase 4 of the Next Generation ASW Training Range Technology Development.	0.000 -	0.590 -	0.663 -	0.000 -	0.663 -
Accomplishments/Planned Programs Subtotals	0.003	4.238	5.574	0.000	5.574

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 0604 / *Training Range & Instr Dev*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/4204: *Weapons Range Support Equipment (WRSE)/ LSRTU/Ocean Systems*	66.941	93.864	101.843	-	101.843	84.035	110.979	112.426	115.771	Continuing	Continuing

Remarks

FY20 increase in OPN 4204 for replacement of Barking Sands Tactical Undersea Range (BARSTUR) fixed anti-submarine warfare (ASW) range instrumentation.

D. Acquisition Strategy

The Training Range and Instrumentation Development (TRID) program is a non-ACAT program. The integrated program teams that develop new TRID capabilities include government and contractor engineering personnel.

E. Performance Metrics

Metric/Description:
Naval Air Warfare Center-Aircraft Division (NAWC-AD): Completion of one Large Area Tracking Range (LATR) upgrade per year. Successful application of system engineering processes. Site acceptance of product improvements.

Jacobs Eng: Site acceptance of LATR product improvements. Successful design, development and testing of product improvements and new capabilities.

Naval Air Warfare Center Weapons Division(NAWC-WD): Completion of one Tactical Training Range (TTR) upgrade per year. Successful application of system engineering processes. Site acceptance of product improvements.

Jacobs Eng: Site acceptance of TTR product improvements. Successful design, development, and testing of product improvements and new capabilities.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Development	C/CPFF	JACOBS ENG : RIDGECREST, CA	13.159	0.000		0.620	Jan 2019	2.047	Nov 2019	-		2.047	0.000	15.826	15.826
Hardware Development	WR	NUWC : NEWPORT, RI	0.455	0.000		0.568	Nov 2018	0.383	Nov 2019	-		0.383	Continuing	Continuing	Continuing
Hardware Development	WR	NAWCTSD : ORLANDO, FL	0.000	0.000		0.565	Nov 2018	1.135	Nov 2019	-		1.135	Continuing	Continuing	Continuing
Software Development	C/CPFF	JACOBS ENG : RIDGECREST, CA	5.439	0.000		0.180	Jan 2019	0.181	Nov 2019	-		0.181	0.000	5.800	5.800
Software Development	WR	NAWC-AD : PAX RIVER, MD	9.035	0.000		0.578	Nov 2018	0.455	Nov 2019	-		0.455	Continuing	Continuing	Continuing
Software Development	WR	NAWC-WD : CHINA LAKE, CA	0.000	0.000		0.677	Nov 2018	0.350	Nov 2019	-		0.350	Continuing	Continuing	Continuing
Prior Year Prod Dev No Longer Funded in the FYDP	Various	Various : Various	100.665	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	128.753	0.000		3.188		4.551		-		4.551	Continuing	Continuing	N/A

Remarks

Increase in Jacobs Engineering Hardware contract and associated software development from FY2019 to FY2020 represents funding required to design, develop and test product improvement for the LATR Fixed Wing (FW) Component Replacement (CR) Pod and the Rotary Wing Tracking Systems (RTS) Ground Systems. The increase in NAWCTSD Hardware development represents the funding required to integrate, test & deliver Smart Antenna deconfliction software and Technical Data Package. Funding to NAWC-WD China Lake provides software upgrades to Simulation Display (SIMDIS).

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWC-AD : PAX RIVER, MD	1.739	0.003	Nov 2017	0.747	Nov 2018	0.567	Nov 2019	-		0.567	Continuing	Continuing	Continuing
Systems Engineering	WR	NAWC-WD : CHINA LAKE, CA	0.626	0.000		0.089	Nov 2018	0.085	Nov 2019	-		0.085	Continuing	Continuing	Continuing
Systems Engineering	WR	NSWC : CORONA, CA	0.985	0.000		0.119	Nov 2018	0.121	Nov 2019	-		0.121	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWC-WD : POINT MUGU, CA	0.050	0.000		0.024	Nov 2018	0.025	Nov 2019	-		0.025	Continuing	Continuing	Continuing
Prior Year Support No Longer Funded in the FYDP	Various	Various : Various	10.576	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	13.976	0.003		0.979		0.798		-		0.798	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year T&E No Longer Funded in the FYDP	Various	Various : Various	5.299	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	5.299	0.000		0.000		0.000		-		0.000	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prog Mngt Sup	WR	NAWC-AD : PAX RIVER, MD	0.077	0.000		0.071	Nov 2018	0.225	Nov 2019	-		0.225	Continuing	Continuing	Continuing
Prior Year Support No Longer Funded in the FYDP	Various	Various : Various	3.662	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	3.739	0.000		0.071		0.225		-		0.225	Continuing	Continuing	N/A

Remarks

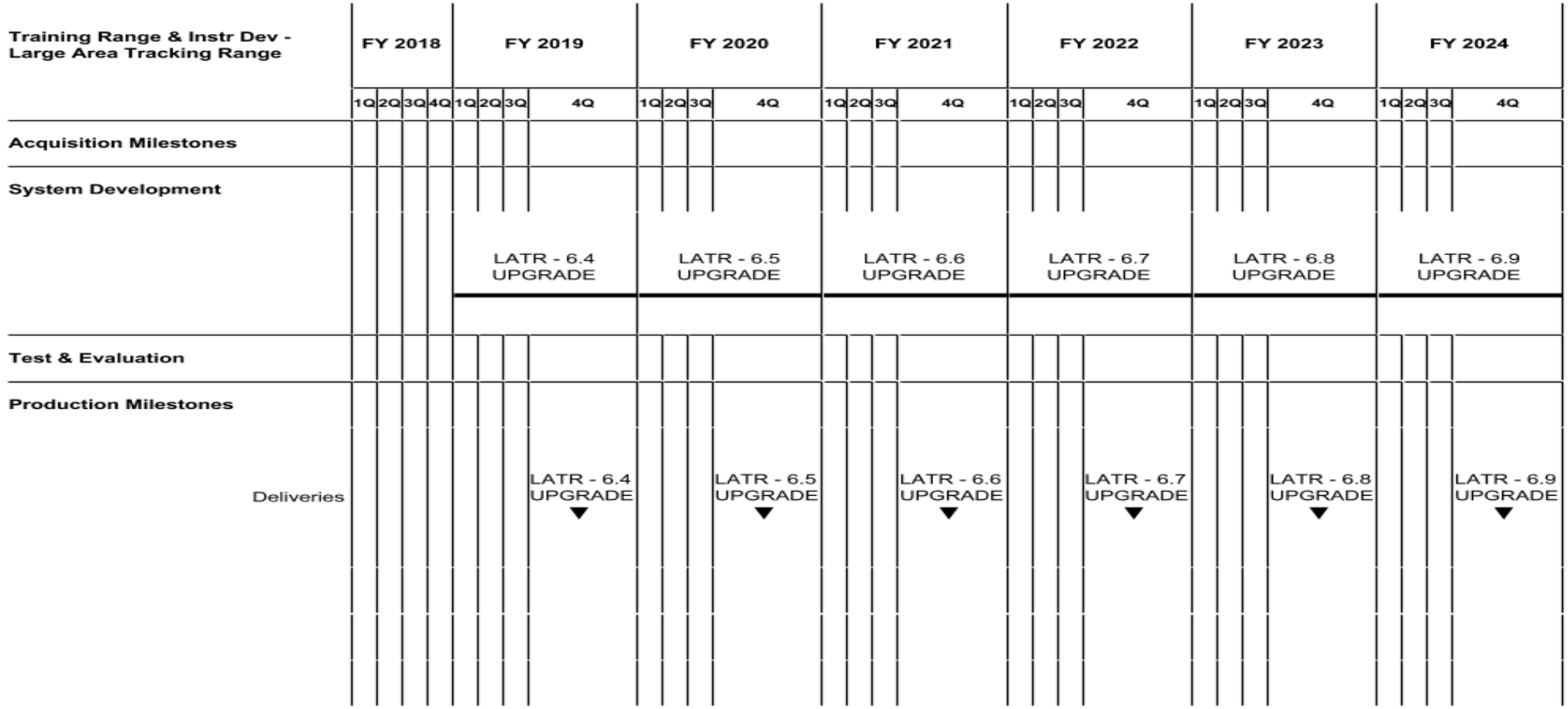
Increase in Government Program Management Support from FY2019 to FY2020 represents the increased level of effort required to Integrate, test & deliver Smart Antenna technology. Increase also includes support required for Smart Antenna technology demonstration during a Live, Virtual and Constructive (LVC) event.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204571N / *Consolidated Trng Sys Dev*	Project (Number/Name) 0604 / *Training Range & Instr Dev*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	151.767	0.003		4.238		5.574		-		5.574	Continuing	Continuing	N/A

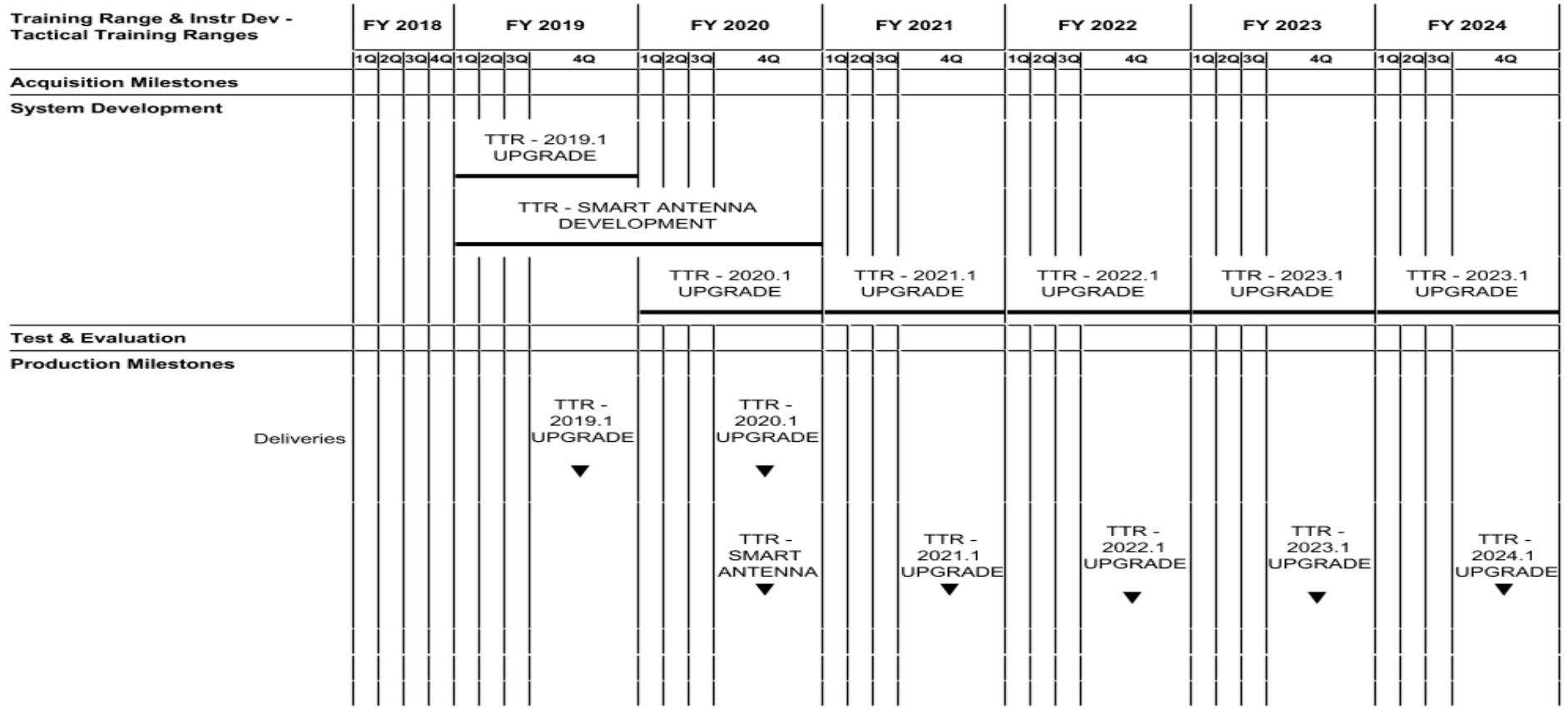
Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 0604 / *Training Range & Instr Dev*



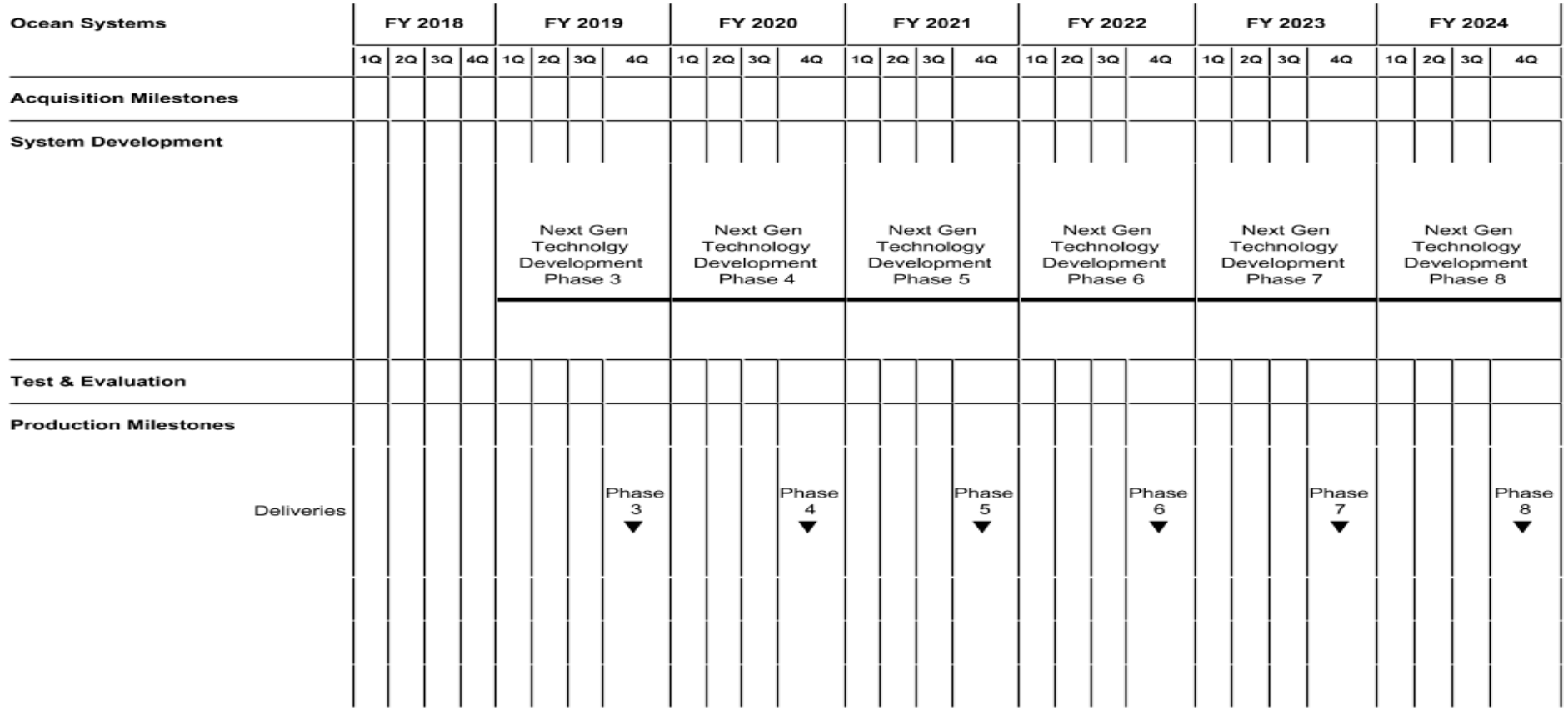
2020DON - 0204571N - 0604

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 0604 / *Training Range & Instr Dev*



2020DON - 0204571N - 0604

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 0604 / *Training Range & Instr Dev*



2020DON - 0204571N - 0604

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 0604 / *Training Range & Instr Dev*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Training Range & Instr Dev - Large Area Tracking Range				
System Development: LATR - 6.4 UPGRADE	1	2019	4	2019
System Development: LATR - 6.5 UPGRADE	1	2020	4	2020
System Development: LATR - 6.6 UPGRADE	1	2021	4	2021
System Development: LATR - 6.7 UPGRADE	1	2022	4	2022
System Development: LATR - 6.8 UPGRADE	1	2023	4	2023
System Development: LATR - 6.9 UPGRADE	1	2024	4	2024
Production Milestones: Deliveries: LATR - 6.4 UPGRADE	4	2019	4	2019
Production Milestones: Deliveries: LATR - 6.5 UPGRADE	4	2020	4	2020
Production Milestones: Deliveries: LATR - 6.6 UPGRADE	4	2021	4	2021
Production Milestones: Deliveries: LATR - 6.7 UPGRADE	4	2022	4	2022
Production Milestones: Deliveries: LATR - 6.8 UPGRADE	4	2023	4	2023
Production Milestones: Deliveries: LATR - 6.9 UPGRADE	4	2024	4	2024
Training Range & Instr Dev - Tactical Training Ranges				
System Development: TTR - 2019.1 UPGRADE	1	2019	4	2019
System Development: TTR - SMART ANTENNA DEVELOPMENT	1	2019	4	2020
System Development: TTR - 2020.1 UPGRADE	1	2020	4	2020
System Development: TTR - 2021.1 UPGRADE	1	2021	4	2021
System Development: TTR - 2022.1 UPGRADE	1	2022	4	2022
System Development: TTR - 2023.1 UPGRADE	1	2023	4	2023
System Development: TTR - 2024.1 UPGRADE	1	2024	4	2024
Production Milestones: Deliveries: TTR - 2019.1 UPGRADE	4	2019	4	2019
Production Milestones: Deliveries: TTR - 2020.1 UPGRADE	4	2020	4	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 0604 / *Training Range & Instr Dev*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: Deliveries: TTR - SMART ANTENNA	4	2020	4	2020
Production Milestones: Deliveries: TTR - 2021.1 UPGRADE	4	2021	4	2021
Production Milestones: Deliveries: TTR - 2022.1 UPGRADE	4	2022	4	2022
Production Milestones: Deliveries: TTR - 2023.1 UPGRADE	4	2023	4	2023
Production Milestones: Deliveries: TTR - 2024.1 UPGRADE	4	2024	4	2024
Ocean Systems				
System Development: Next Gen Technology Development Phase 3	1	2019	4	2019
System Development: Next Gen Technology Development Phase 4	1	2020	4	2020
System Development: Next Gen Technology Development Phase 5	1	2021	4	2021
System Development: Next Gen Technology Development Phase 6	1	2022	4	2022
System Development: Next Gen Technology Development Phase 7	1	2023	4	2023
System Development: Next Gen Technology Development Phase 8	1	2024	4	2024
Production Milestones: Deliveries: Phase 3	4	2019	4	2019
Production Milestones: Deliveries: Phase 4	4	2020	4	2020
Production Milestones: Deliveries: Phase 5	4	2021	4	2021
Production Milestones: Deliveries: Phase 6	4	2022	4	2022
Production Milestones: Deliveries: Phase 7	4	2023	4	2023
Production Milestones: Deliveries: Phase 8	4	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204571N / *Consolidated Trng Sys Dev*	Project (Number/Name) 1427 / *Surface Tactical Team Trainer (STTT)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1427: *Surface Tactical Team Trainer (STTT)*	119.025	15.081	42.046	67.790	-	67.790	51.628	37.067	19.183	16.325	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Department's submission reflects the results of a deep dive into Fleet Training Wholeness (FTW) and how to provide a means for Strike Group Training in a contested environment, in accordance with Chief of Naval Operations guidance and Fleet Training Wholeness 2025 objectives. The analysis determined the most cost effective means to provide this training is via a combination of Live Virtual Constructive (LVC) capabilities. The department of the Navy has identified 21 LVC Capabilities that began in FY19 leveraging combat system product line architecture components, contract vehicles, warfare center subject matter experts, and engineering practices for iterative development. The deep dive identified that there is no other cost effective way train in a contested environment. The foundation for LVC has already been established. FY20 continues the iterative investment strategy to provide initial at sea LVC capability to train a Strike Groups in the environment they expected to fight in. The development, integration and testing of LVC's, along with ensuring interoperability with surface and air communities, will be accomplished across Integrated Warfare Systems (IWS), Navy Continuous Training Environment (NCTE), and the Navy's Tactical Training Network.

Surface Tactical Team Trainer (STTT) develops modifications during sustainment of Battle Force Tactical Training (BFTT) system and modernization into the Advanced Training Domain (ATD). Both BFTT and ATD are the core system that is used to integrate the weapon system elements, and combat system components to create the Total Ship Training Capability (TSTC). BFTT and ATD continue to integrate and update, as new tactical capabilities are being introduced, to enable crew operator proficiency training for basic and sustainment level training events, through distributed strike group certification fleet synthetic training (FST) events and including Composite Training Unit Exercise (COMPTUEX) FST
at Sea integration into LVC environment. Continued Development is required to integrate new capabilities and interfaces to provide training for AEGIS and Ships Self Defense System (SSDS) combat system capability upgrades, and to address the Fleet's LVC FTW initiative. Additionally, modernization is needed to support the Department of Defense (DoD) Training Transformation Plan, the Chief of Naval Operations Fleet Response Plan and Commander United States Fleet Forces Command Fleet Readiness Training Plan.

The Advanced Training Domain (ATD) is being developed to combine BFTT and the AEGIS Combat Training System (ACTS) into a common system that integrates with AEGIS Base Line (BL) 9.2.2 And Follow, and Ships Self Defense System (SSDS) BL 11.xAF. ATD is being hosted along with the AEGIS and SSDS combat system on Technical Insertion (TI)-16 common processing and display hardware. ATD is being designed to be the core of the Total Ship Training Capability, and is projected to be more reliable, simpler to use, and architected to be extensible to meet interoperability and capability enhancement challenges in the future.

The BFTT is being updated to maintain integration and capability enhancements developed for the Cooperative Engagement Capability (CEC), Surface Electronic Warfare Improvement Program (SEWIP), and the Carrier Tactical Support Center (CV-TSC), and SSDS Fire Control Loop Improvement Program.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

TSTC provides realistic joint warfare training across the spectrum of armed conflict, realistic unit level team training in all warfare areas (e.g. NIFC-CA and BMD missions to support IAMD). TSTC provides ships' Commanding Officers and Battle Group/Battle Force Commanders with the ability to conduct coordinated realistic, high stress, combat system level team training as an integral part of the Afloat Training Organization, the Tactical Training Groups and C2F/C3F FST/LVC events.

Develop and integrate MH-60R simulator to enable single ship basic and sustainment training, and distributed multi-ship pier-side Fleet Synthetic Training (FST) events.

Develop and Integrate Cooperative Engagement Capability (CEC) Enhanced Training (CET) to enable single ship basic and sustainment training, and distributed multi-ship pier-side FST events. CET also provide enable proficiency training of Naval Integrated Fire Control - Counter Air (NIFC-CA) capability.

Develop CEC Interim Training (CIT) capability to enable multi-ship pier-side FST events.

Develop and integrate upgrades to Battleforce Electronic Warfare Trainer (BEWT) to support soft kill training with NULKA Decoys.

Develop Identification Friend or Foe (IFF) simulator to enable training of Modes 1, 2, 3A, 4, C, 5 and S on both AEGIS and SSDS ships. Capability will support AEGIS and SSDS IFF MODE 4/5 Integration program will address training Mode 4 Inoculation, and allow training of Modes 5 and S IFF.

Develop and integrate commensurate training improvements to Ships Self Defense System in support of Enhanced Sea Sparrow Missile (ESSM) and Electronic Warfare (EW) tactical improvements.

Integrate Navy Continuous Training Environment (NCTE) networking and cyber security upgrades.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Surface Tactical Team Trainer (STTT)	15.081	14.598	15.350	0.000	15.350
Articles:	-	-	-	-	-
FY 2019 Plans: ATD 1.0: Delivered Advanced Training Domain (ATD) 1.0 system and software to support training on Aegis Baseline (BL) 9.2.2 and SSDS BL 11.x ATD 1.1: Conducted integration testing of ATD 1.1 with Aegis Baseline (BL) 10.x. Develop and integrate Close-In Weapons Systems (CIWS) simulator and develop and integrate Gun Weapon System Training Capability to meet Aegis BL 10.X requirements.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
BFTT 5.1.2: Delivered Battle Force Tactical Training (BFTT) Software updates to support Fire Control Loop Improvement Program (FCLIP) on Ships Self Defense System (SSDS), to include integration at CIWS Simulator leveraged from Aegis BL 10 development. ***FY 2020 Base Plans:*** - Continue development, integration, and testing of Advanced Training Domain (ATD) on Aegis BL 10 and SSDS BL 11. - Develop changes to BFTT to incorporate ATD Human Machine Interface (HMI) to modernize BFTT in ships without TI-16 computing and display infrastructure. - Complete testing and integration of CIWS Simulator with BFTT and ATD. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $.752M is for the development of the Close-In Weapon System (CIWS) Simulator and Integration into both BFTT and ATD with expected completion in FY20. This will support training with SSDS Fire Control Loop Improvement Project (FCLIP) enhancements, and AEGIS Base Line 10.x CIWS Integration capability.					
Title: Fleet Training Wholeness	0.000	17.835	38.820	0.000	38.820
Articles:	-	-	-	-	-
Description: Increase in PB20 required to provide a means for Strike Group Training to implement Fleet Training Wholeness (FTW) in a contested environment. ***FY 2019 Plans:*** Developed, tested and integrated Engineering Change Proposals (ECP) to implement ability to inject and tag simulated contacts into live shipboard air-search radars, for augmenting live exercises with simulation, thereby reducing the need for live training assets. This is key to providing the ability to train using live, virtual and constructive capabilities needed for fleet synthetic training underway. Failure to update the radar systems, will prevent ability to augment live underway exercises with synthetic contacts. Developed, tested and integrated changes to allow simulated contacts to be overlaid with tactical contacts, on AEGIS and Ships Self Defense System (SSDS) combat systems, which is a critical enabler for implementing live, virtual, constructive capabilities in support of fleet synthetic training underway. Failure to update combat systems will prevent the ability to safely participate in live exercises that are augmented with simulation.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Developed, tested and Integrated a Gun Weapon System (GWS) simulations and Electronic Optical Sensor System (EOSS) simulations to provide a means of conducting surface warfare training capability on AEGIS, and reduce dependence on live fire training. Failure to implement GWS/EOSS training capability will result in the inability to conduct effective surface warfare training. Developed changes to implement capability to conduct Strike Group Cooperative Engagement Capability (CEC) underway to enable distribution of training data over the live CEC data links to support training of advanced tactical capabilities during fleet synthetic training exercises. Failure to update CEC will prevent fleet from training to AEGIS and SSDS Combat Systems capability advancements and is a critical capability for FTW. Assessed safety issues related to navigation distribution and develop Courses Of Action (COA) to mitigate concerns and potential hazards with conducting shipboard synthetic training underway. Failure to conduct the assessment could adversely impact the ability to safely conduct underway training in a live, virtual and constructive environment. Developed, tested and Integrated combat system data collection and after-action review capability that will provide an effective means for instructors to assess operator, and crew performance during training events. Failure to develop assessment tools will impact ability to quantitatively assess operator and crew performance during training exercises. Developed, Tested, and Integrated shipboard synthetic tactical radios that communicate over NCTE to enable exercise coordination between ships and shore sites for fleet synthetic events. Failure to develop synthetic tactical radios will impact ability to coordinate training exercises without the need of temporarily installed communication devices. Modified weapon systems modifications to integrate Live, Virtual, and Constructive (LVC) functionality and safety. Initiate Battle Force Tactical Training (BFTT) and Advanced Training Domain (ATD) development efforts to integrate					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
LVC capabilities. Failure of not modifying weapons systems will impact the ability for AEGIS and SSDS ships from participating in underway training events in a live, virtual and constructive environment, ultimately impacting ability to adequately conduct strike group certification training events. ***FY 2020 Base Plans:*** Continue developing changes to implement capability to conduct Strike Group Cooperative Engagement Capability (CEC) underway to enable distribution of training data over the live CEC data links to support training of advanced tactical capabilities during fleet synthetic training exercises. Failure to update CEC will prevent fleet from training to AEGIS and SSDS Combat Systems capability advancements and is a critical capability for FTW. Continue development and integration of ATD for Aegis BL 10 and SSDS BL 11. Deliver and integrate Radar Sensor Live over Sim capability for Aegis and SSDS. Conduct systems enginee3ring activities to embed the Combined Integrated Air and Missile Defense (IAMD) and Anti-Submarine Warfare (ASW) Trainer (CIAT) on Aegis BL 10. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $20.985M is in support of Fleet Training Wholeness (FTW) Initiatives. The fleet training wholeness efforts include modifications shipboard sensors to inject simulation on top of live sensor returns, integration of MK-34 Gun Weapon System training capability to enable surface warfare into integrated training events, Modifications of Cooperative Engagement Capability to distribute training data while ships are underway, integrate synthetic radios, and funds for AEGIS and SSDS weapon systems to process Simulation over Live during underway fleet training exercises. Also as part of FTW is to the begin the systems engineering activity to integrate the Combined Integrated Air and Missile Defense (IAMD) and Anti-Submarine Warfare (ASW) Trainer onto the next generation AEGIS Destroyer.					
Title: DDG 1000 Wholeness/Surface Strike ***Articles:*** ***Description:*** Increase in PB20 required to provide a means for Strike Group Training to implement training into DDG 1000. ***FY 2019 Plans:***	0.000 -	9.613 -	13.620 -	0.000 -	13.620 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Developed, tested and installed embedded shipboard training capability to support organic within the lifelines and multi-ship distributed combat systems training requirements as outlined in the DDG 1000 Navy Training Support Plan (NTSP). Capability will allow DDG 1000 class ships to participate in distributed Fleet Synthetic Training (FST) events. FST events are used for advance warfare training, and work ups to strike group deployment certification. Failure to execute plans, will prevent DDG 1000 to participate, with the other ships, other services and coalition partners in FST events. DDG 1000 On-Board Trainer development began FY19, Shore Training facility will be upgraded to represent shipboard configuration, testing will be conducted to ensure requirement as outlined in DDG 1000 Navy training Support Plan (NTSP), and to ensure interoperability with Navy Continuous Training Environment (NCTE). Copies of the system will then be developed and installed on board DDG 1000 Class Ships. ***FY 2020 Base Plans:*** Continue development and begin integration testing of DDG 1000 Shipboard Training Capability. Continue development and integration of the DDG 1000 On-Board Trainer (OBT) within the DDG 1000 shipboard Data Center to ensure requirements of DDG 1000 Navy Training Support Plan (NTSP) are achieved. Conduct testing to ensure interoperability with the Navy Continuous Training Environment (NCTE) to support pier-side multi-ship fleet synthetic training exercises. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $4.007M is required to complete the development, integration and testing of the DDG-1000 On-Board Training (OBT) capability, as outlined in the DDG 1000 Navy Training Support Plan (NTSP).					
Accomplishments/Planned Programs Subtotals	15.081	42.046	67.790	0.000	67.790

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTE/0604307N/3357: *Aegis Training Improvement Program*	7.717	6.946	10.078	-	10.078	8.898	7.968	6.139	5.348	Continuing	Continuing
• RDTE/0604755N/3358: *SSDS Training Improvement Program*	7.347	7.831	8.532	-	8.532	12.575	11.729	10.299	9.280	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/5664/TBD: *Other Training Equipment (Surface BFTT/TSTC portion only) New BLI FY17*	23.722	29.057	57.364	-	57.364	55.300	53.789	35.988	36.534	Continuing	Continuing

Remarks

D. Acquisition Strategy

The BFTT acquisition strategy for system development utilizes the Advanced Capability Build (ACB) development model, as mandated by OPNAV. Incremental acquisition and fielding, utilizing commercial off-the-shelf technology to the extent possible, is in accordance with OPNAV LTR Ser N86/9U179029 dtd 31 Jul 09.

E. Performance Metrics

TSTC BFTT Core component will be developed to meet the following developmental milestones. These milestones are in close alignment with AEGIS BL9.C2 and SSDS MK 2 development milestones and integration events. (see R-4)

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Development	C/FFP	GTS : Virginia Beach, VA	15.457	0.571	Dec 2017	0.580	Dec 2018	0.620	Dec 2019	-		0.620	Continuing	Continuing	Continuing
Systems Engineering	WR	SEA02/NSWC Dam Neck/NSWC Dahlgren : NAVSEA/ Dam Neck/NSWC Dahlgren	29.901	5.370	Dec 2017	15.849	Dec 2018	26.053	Dec 2019	-		26.053	Continuing	Continuing	Continuing
		Subtotal	45.358	5.941		16.429		26.673		-		26.673	Continuing	Continuing	N/A

Remarks

Systems Engineering Increases for developing the engineering change to implement the ability for the combat systems and sensors to augment live exercises with simulation, begin engineering solutions to embed the Combined IAMD and ASW Trainer on the next AEGIS Baseline, and to develop the engineering changes to incorporate the DDG 1000 On-Board Trainer (OBT) within the ships data centers.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development	WR	NSWC Dam Neck/ SEA 02 : WR/REQN	46.792	5.217	Dec 2017	17.977	Dec 2018	33.332	Dec 2019	-		33.332	Continuing	Continuing	Continuing
		Subtotal	46.792	5.217		17.977		33.332		-		33.332	Continuing	Continuing	N/A

Remarks

Software Development increases for developing combat system and sensor software changes to implement the capability to augment live exercises with simulation; develop the CIWS Simulation for integration on to SSDS and AEGIS; and develop the software modifications to integrate DDG 1000 On-board Trainer.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC Dam Neck/ SEA 02 : WR/REQN	15.610	1.767	Dec 2017	6.125	Dec 2018	6.164	Dec 2019	-		6.164	Continuing	Continuing	Continuing
		Subtotal	15.610	1.767		6.125		6.164		-		6.164	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Support	WR	NSWC Dam Neck/ SEA02 : WR/REQN	11.265	2.156	Dec 2017	1.515	Dec 2018	1.621	Dec 2019	-		1.621	Continuing	Continuing	Continuing
		Subtotal	11.265	2.156		1.515		1.621		-		1.621	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	119.025	15.081		42.046		67.790		-		67.790	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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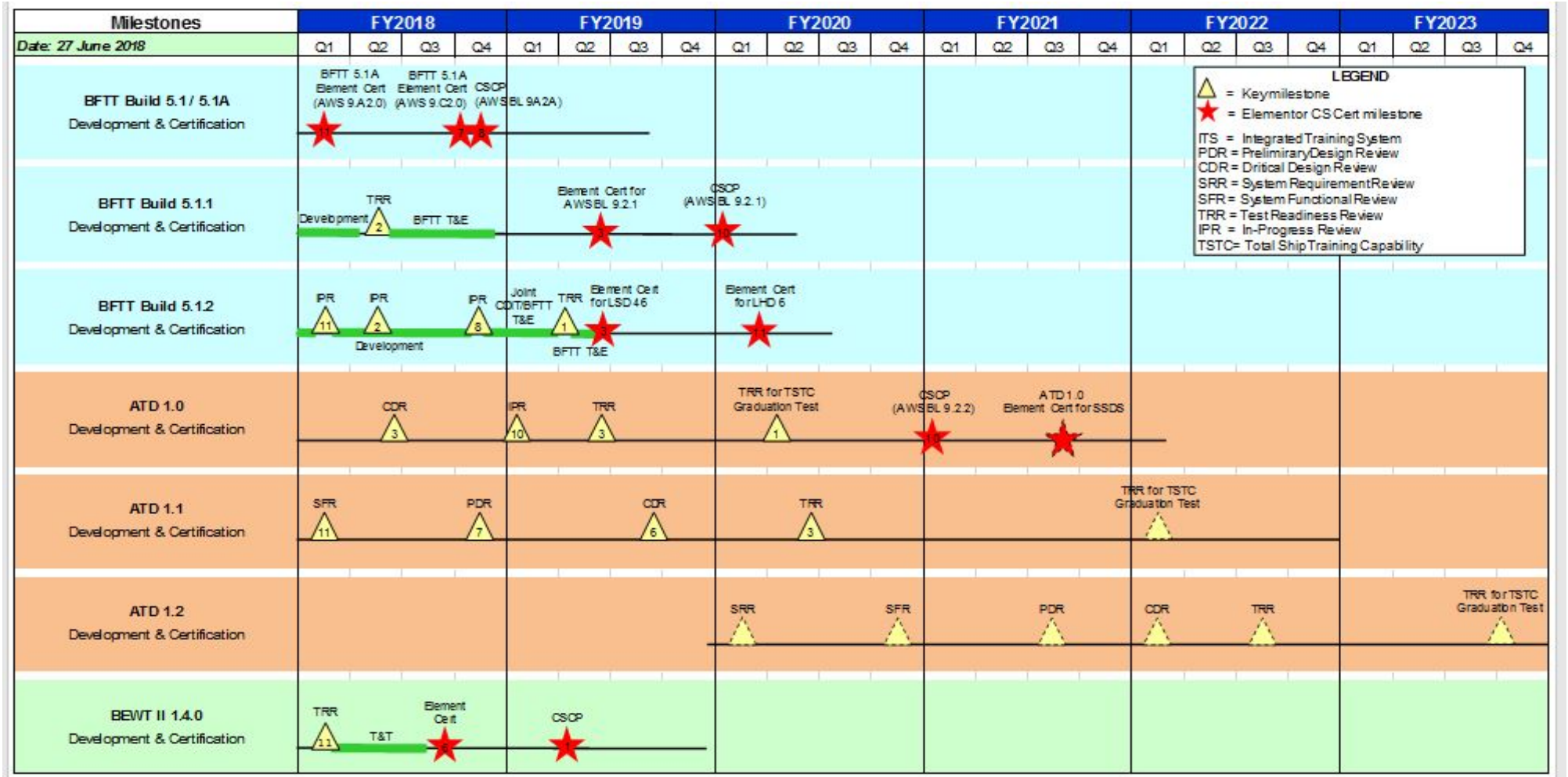

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1427				
BFTT 5.1A Element Cert for AWS 9.A2.0	1	2018	1	2018
BFTT 5.1A Element Cert AWS 9.C2.0	4	2018	4	2018
CSCP Element Cert AWS BL 9A2A	4	2018	4	2018
BFTT BUILD 5.1.1 TRR	2	2018	2	2018
BFTT BUILD 5.1.2 IPR	1	2018	1	2018
BFTT BUILD 5.1.2 IPR2	4	2018	4	2018
ATD 1.0 CDR	2	2018	2	2018
ATD 1.1 SFR	1	2018	1	2018
ATD 1.1 PDR	4	2018	4	2018
BEWT II 1.4.0 TRR	1	2018	1	2018
BEWT II 1.4.0 Element Cert	3	2018	3	2018
BFTT Build 5.1.1 Element Cert AWS 9.2.1	2	2019	2	2019
BFTT Build 5.1.2 TRR	1	2019	1	2019
BFTT Build 5.1.2 Element Cert for LSD 46	2	2019	2	2019
ATD 1.0 IPR	1	2019	1	2019
ATD 1.0 TRR	2	2019	2	2019
ATD 1.1 CDR	3	2019	3	2019
BEWT II 1.4.0 Element Cert CSCP	2	2019	2	2019
BFTT 5.1.1 Element Cert CSCP for AWS 9.2.1	1	2020	1	2020
BFTT BUILD 5.1.2 Element Cert for LHD 6	1	2020	1	2020
ATD 1.0 TRR for TSTC Graduation Test	2	2020	2	2020
ATD 1.1 TRR	2	2020	2	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 1427 / *Surface Tactical Team Trainer (STTT)*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
ATD 1.0 Element Cert for SSDS (est.)	3	2021	3	2021
ATD 1.0 Element Cert CSCP AWS BL 9.2.2	1	2021	1	2021
ATD 1.1 TRR for TSTC Graduation test (est.)	3	2023	3	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204571N / *Consolidated Trng Sys Dev*	Project (Number/Name) 2124 / *Air Warfare Training*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2124: *Air Warfare Training*	49.516	1.558	1.709	1.700	-	1.700	1.614	1.647	1.679	1.712	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project transitions new training and range system technologies for use in Naval Aviation training. Products from this effort are directly tied to the Navy Aviation Simulation Master Plan (NASMP), MH-60R/S master plan, Unmanned Aerial Systems (UAS) master plan, the PMA-205 Strategic Plan, the Live Virtual Constructive (LVC) program, component technologies, including the Multiplex Data Bus Controller Translator Transmitter, F/A-18C-F Requirements Procurement Plan (RPP), open architecture implementation, multiple technology refresh efforts and the Multi-Mission Maritime Aircraft/P-8 programs. These efforts will support training optimization of future naval aviation training/preview/mission rehearsal systems (fixed, deployed, and unmanned). Tasks include: specification development to provide for common, modular, High Level Architecture compliant, high fidelity Distributed Mission Training and mission rehearsal capabilities ashore and afloat. Technologies to be developed and integrated include: intelligent semi-automated forces (SAF) technologies, automated performance measurement technology, advanced net-ready weapons simulation, Air to Air/Air to Ground, visual/sensor enhancement, common post mission assessment technologies, tablet mission preview technology, advanced visual-sensor technology, high resolution helmet mounted, and/or flat panel displays, 20-20 visual acuity image generation, Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR) technology, NAVAIR Portable Source Initiative improvements, common correlated data set technologies and heterogeneous data fusion, common link, common software/database reuse technologies, advanced environmental effects modeling, fused radar/infra-red/electro-optic and acoustic sensor simulations, aerodynamic modeling, physics-based infra-red simulations, spatial disorientation and simulator sickness research, communications degradation modeling, and final Test and Evaluation (T&E) within the Aviation Training Technology Integration Facility (ATTIF), Naval Air Warfare Center-Aircraft Division. This Manned-Flight Simulator (MFS) ATTIF capability provides a window to fleet aviators for critical comment, evaluation and fine tuning of new, interoperable, and innovative technologies such as LVC before final transition to the fleet. Naval Aviation Distributed Training Center, debrief/After Action Review (AAR), and intelligent training tools for the virtual environment are focused on human performance and trend analysis enhancements for fleet readiness and distributed mission training at all levels.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: HUMAN/INSTRUCTIONAL SYSTEMS INTEGRATION	0.732	0.959	0.960	0.000	0.960
Articles:	-	-	-	-	-
Description: Develop common After Action Review (AAR) and platform-unique post mission assessment, Intelligent Tactical SAF, and high fidelity simulator component technologies to include AR/VR/MR HMD technologies. After Action Review (AAR), and high fidelity components such as Intelligent SAF designs lower Navy Aviation Simulation Master Plan (NASMP) upgrade and simulator life-cycle costs. Integrate Voice-Capable semi-automated forces (SAF) component technologies, improve open common instructor interface effectiveness and provide for multi-SAF exercise utilization. Analyze, develop, and integrate common architecture components for F/A-18C-F, EA-18G, MH-60R/S, Unmanned Aerial Systems (UAS) platforms, E-2C/D & United States Marine Corps mission areas, intelligent instructor operator components, automated					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 2124 / *Air Warfare Training*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
performance measurement technologies, Tactical Aircraft/ Multi-Mission Maritime Aircraft/ Reduced Oxygen Breathing Device-Spatial Disorientation technologies/devices common graphic user interface initiatives, common threat system formats, Next Generation Threat System (NGTS) technology transitions, Joint Semi-Automated Forces (JSAF) compatibility, cross platform post mission performance measurement, Multi-purpose Reconfigurable Maintenance Training Systems, (MRTS) and after action review/debrief innovations, thereby maximizing return on investment for instructional systems technology investments. ***FY 2019 Plans:*** Continue fidelity improvements for synthetic entity systems (e.g. NGTS, JSAF), including virtual crewman and wingman capability and speech recognition control. Continue test and evaluation of alternate mask-on hypoxia training device. Continue T-45 Augmented Reality Visual System (ARVS) trainer development and evaluation. Develop automated scoring and debrief technology for use in multi-team, distributed, and Live, Virtual and Constructive (LVC) training environments. Continue development of the Post Mission Assessment for Tactical Training (PMATT) for rotary wing and multiplatform environments. Perform training effectiveness experiments on low footprint, AR/VR/MR based training devices/simulators. Develop technologies to fuse and leverage metrics from disparate, heterogenous databases to support currency and training requirements analysis (e.g., CVN LSO database). ***FY 2020 Base Plans:*** Continue fidelity improvements for synthetic entity systems (e.g. NGTS, JSAF), including virtual crewman and wingman capability and speech recognition control. Develop heterogenous data fusion capability to support intelligent, semi-automated performance measurement and debrief capability in support of Live, Virtual and Constructive (LVC) training environments. Continue development of the Post Mission Assessment for Tactical Training (PMATT) for rotary wing and multiplatform environments. Perform training effectiveness experiments on low footprint, AR/VR/MR based training devices / sims. Develop technologies to fuse and leverage metrics from disparate, heterogenous databases to support currency and training requirements analysis (e.g., CVN LSO database). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 2124 / *Air Warfare Training*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Minimal increase of one thousand dollars in order to continue fidelity improvements for synthetic entity systems, heterogenous data fusion, performance measurement and debrief, and AR/VR/MR technologies as described in the base FY20 plans.					
Title: SENSORS AND ENVIRONMENT	0.525	0.250	0.240	0.000	0.240
Articles:	-	-	-	-	-
Description: Develop common and platform unique sensor, visual, and environmental simulation (atmospherics or acoustics) into fidelity upgrades with Commercial Off The Shelf and/or Government Off the Shelf (GOTS) Software. Perform risk reduction, advanced displays innovation, test and evaluation, integration, and production of Common Sensor Model, High Fidelity Active-Acoustics Sensor Operator Training, 3D Ocean effects, Anti-Submarine Warfare (ASW) acoustic fidelity assessments, 3D weather effects, 3D Ocean acoustic modeling, new Reduced Oxygen Breathing Device (ROBD)& Spatial Disorientation (SD), and legacy device technologies. Demonstrate GOTS capability for cost-effective database materialization, Material Properties Reference Dataset library, associated NAVAIR Portable Source Initiative specifications and processes for implementation on Distributed Mission Training, deployed trainers, legacy, and new visual system upgrade programs to include Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR). In support of Navy Aviation Simulation Master Plan (NASMP) upgrade efforts, develop texture storage, sensor-environmental effects, NAVAIR Portable Source Initiative material reference processes/standards, automated technology applications for real time publishing, shadows, cultural lighting, combat, and weather effects and very high resolution visualization technologies, to include tablet-based mission preview for tactical aircrew. ***FY 2019 Plans:*** Continue investigation of collaborative environmental database for time-critical terrain updates for deployable mission rehearsal trainers. Develop AR/VR/MR Head Mounted Display (HMD) to provide near human visual acuity. Develop haptic feedback capability to support AR/VR/MR interaction. Develop Near Eye Display (NED) Metrology system for verifying the performance of Virtual and Augmented Reality goggle displays. Develop and test metrics and procedures for equating the performance of virtual and augmented reality display systems to legacy Navy Aviation Simulation Master Plan (NASMP) display systems. Develop tests and metrics to evaluate performance and utility of Mixed Reality training devices (i.e., HMD that integrates virtual world with real world). ***FY 2020 Base Plans:*** Continue investigation of collaborative environmental database for time-critical terrain updates for deployable mission rehearsal trainers. Develop AR/VR/MR Head Mounted Display (HMD) to provide near human visual acuity. Develop haptic feedback capability to support AR/VR/MR interaction. Develop Near Eye Display (NED) Metrology system for verifying the performance of Virtual and Augmented Reality goggle displays. Develop and					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 2124 / *Air Warfare Training*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
test metrics and procedures for equating the performance of virtual and augmented reality display systems to legacy Navy Aviation Simulation Master Plan (NASMP) display systems. Continue development of tests and metrics to evaluate performance and utility of Mixed Reality training devices (i.e., HMD that integrates virtual world with real world). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of ten thousand dollars due to reduction in contract service support.					
Title: LIVE VIRTUAL CONSTRUCTIVE (LVC), AND VISUALS	0.301	0.500	0.500	0.000	0.500
Articles:	-	-	-	-	-
Description: Air Warfare Training Development provides for risk mitigation and next generation platform, Unmanned Aerial Systems, Live Virtual Constructive (LVC) and associated visualization component development for Navy aviation distributed mission training, and distributed training centers (NADTC), as well as for stand-alone and small footprint deployable devices. Provided integrated capability assessment for Ranges, Experimentation products, and Training. Support the NASMP upgrade efforts and Type/Model/Series programs with advanced visual system display configurations requirements. Assess trainee cognitive requirements and the development and incorporation of next generation Live Virtual Constructive (LVC), Unmanned Aerial Systems (UAS) constructive and associated debrief/After Action Review (AAR) visualization component technologies. Additionally, Air Warfare Training Development (AWTD) provides for advanced virtual component fidelity improvements for Live Virtual Constructive capability (such as "Mobility" Part-Task Trainers and the Multiplex Data Bus Controller Translator Transmitter (MDBCTT)). LVC technologies will facilitate advanced, cost effective weapons and tactics training and emerging capability requirements in the Air-Sea battlespace and Naval Integrated Fire Control-Counter Air (NIFC-CA) capabilities development. ***FY 2019 Plans:*** Continue analytical and developmental support for emergent programs of record in Live, Virtual and Constructive (LVC), integrated warfare, acoustic simulation environments, warfighter performance assessment, threat system enhancements, and sensor/visualization modeling. Develop and integrate additional Manually Operated Visual Landing Aid System(MOVLAS) capability into Landing Signal Officer (LSO) Station for the expandable flight deck crew trainer. Develop and test prototype Embedded Next Generation Threat System (NGTS) for TCTS Inc					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
II Participant Subsystem. Develop cross domain solutions to support LVC, integrated warfare, and distributed mission training. Develop metrics for cross-platform NIFC-CA and integrated warfighting capability. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** Continue analytical and developmental support for emergent programs of record in Live, Virtual and Constructive (LVC), integrated warfare, acoustic simulation environments, warfighter performance assessment, threat system enhancements, and sensor/ visualization modeling. Develop integrated expandable flight deck crew trainer based on Commercial Off the Shelf (COTS) virtual and augmented reality technology. Develop prototype virtual reality Landing Signal Officer (LSO) Station for the expandable flight deck crew trainer. Develop cross domain solutions to support LVC, integrated warfare, and distributed mission training. Develop metrics for cross platform NIFC-CA and integrated warfighting capability.					
Accomplishments/Planned Programs Subtotals	1.558	1.709	1.700	0.000	1.700

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0705:: *COMMON GROUND EQUIPMENT - TRAINING*	181.145	179.674	292.015	-	292.015	252.165	218.093	239.165	231.018	Continuing	Continuing

Remarks

D. Acquisition Strategy

Air Warfare Training Development (AWTD) is a BA 07 RDT&E joint technology transition program tied to the PMA-205 Strategic Plan, Navy Aviation Simulation Master Plan (NASMP), United States Marine Corps upgrades and the various platform simulation master plans with the purpose of transitioning advanced training and mission preview/rehearsal technologies. AWTD provides risk mitigation, test and evaluation, and prototype development for stand-alone, manned, un-manned, distributed, open systems and deployed training systems for the warfighter utilizing an Integrated Product Team approach and a combination of reimbursable and direct cite/cost-plus time and material (T&M) contracts.

E. Performance Metrics

Naval Air Warfare Center-Training Systems Division (NAWC-TSD): # of transitions to Fleet Platforms. For each transition, successful Technical Readiness Level (TRL) testing and device Ready for Training (RFT) to Fleet platforms. Seminal transition events are either RFT or tech-refresh Authority to Operate.

NAWC-Aircraft Division (AD): Complete TRL & compliance testing for Navy Aviation Simulation Master Plan (NASMP) and Information Assurance directives.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development	C/CPFF	Bohemia Interactive : ORLANDO, FL	0.324	0.448	Jan 2018	0.277	Mar 2019	0.277	Mar 2020	-		0.277	0.000	1.326	1.326
Software Development	C/CPFF	Soar Technology, Inc. : ORLANDO, FL	0.000	0.070	Dec 2018	0.000		0.000		-		0.000	0.000	0.070	0.070
Software Development	C/CPFF	Aptima : WOBURN, MA	0.424	0.000		0.232	Mar 2019	0.232	Mar 2020	-		0.232	0.000	0.888	0.888
Software Development	WR	NAWCTSD : ORLANDO, FL	24.179	0.729	Nov 2017	0.549	Nov 2018	0.550	Nov 2019	-		0.550	Continuing	Continuing	Continuing
Prior Year Prod Dev No Longer Funded in the Budget or Out Years	Various	Various : Various	10.622	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	35.549	1.247		1.058		1.059		-		1.059	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Logistics	WR	NAWCAD : PATUXENT RIVER, MD	0.051	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Logistics	WR	NAWCTSD : ORLANDO, FL	0.000	0.020	Nov 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering	WR	NAWCAD : PATUXENT RIVER, MD	0.033	0.035	Nov 2017	0.120	Nov 2018	0.120	Nov 2019	-		0.120	Continuing	Continuing	Continuing
Systems Engineering	WR	NAWCTSD : ORLANDO, FL	0.000	0.020	Nov 2017	0.150	Nov 2018	0.150	Nov 2019	-		0.150	Continuing	Continuing	Continuing
Prior Year Support No Longer Funded in the Budget or Out Years	Various	Various : Various	3.803	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	3.887	0.075		0.270		0.270		-		0.270	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWC AD : PAX RIVER, MD	7.588	0.000		0.060	Nov 2018	0.060	Nov 2019	-		0.060	Continuing	Continuing	Continuing
		Subtotal	7.588	0.000		0.060		0.060		-		0.060	Continuing	Continuing	N/A

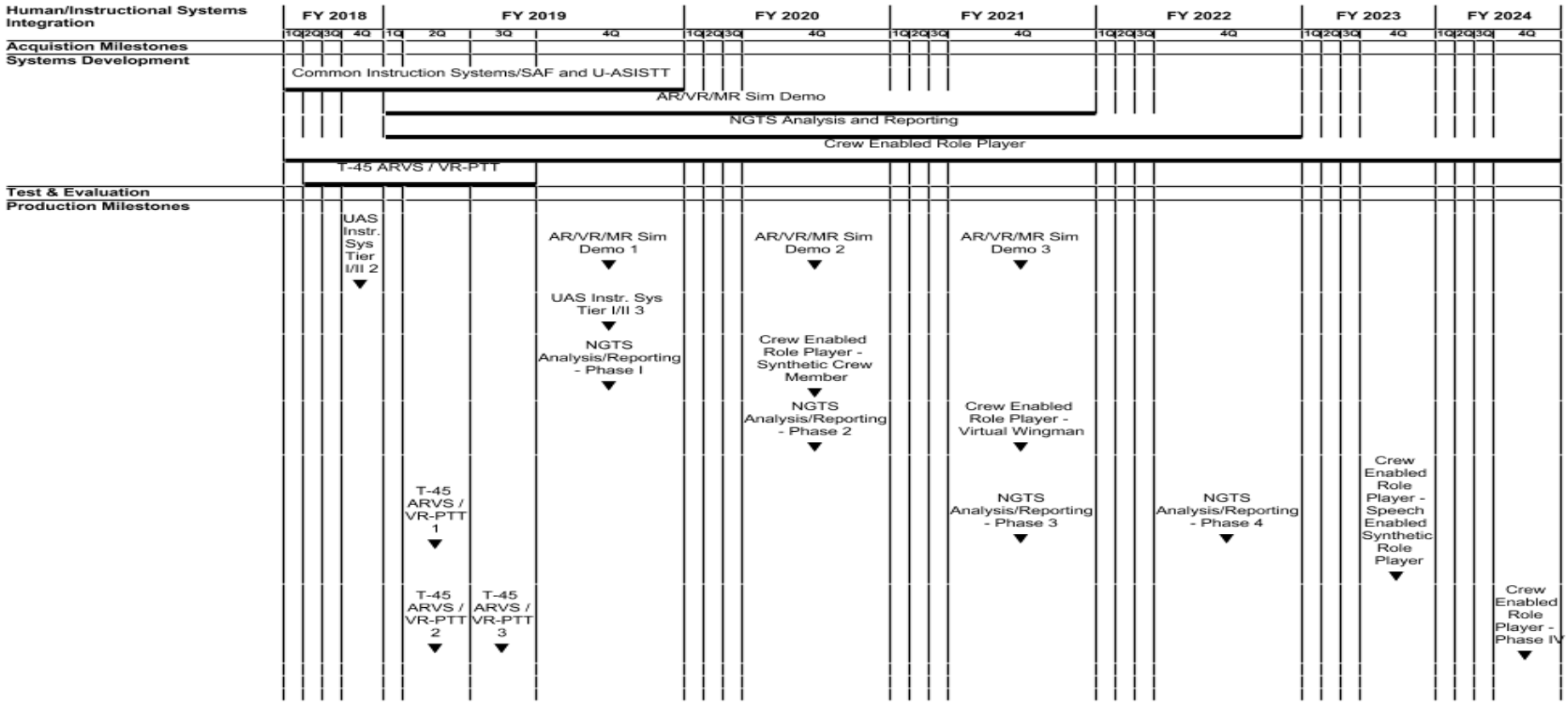
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	Precise : LEXINGTON PARK, MD	0.398	0.149	Feb 2018	0.134	Feb 2019	0.124	Feb 2020	-		0.124	0.000	0.805	0.805
Program Management Support	WR	NAWC AD : PAX RIVER, MD	0.000	0.075	Nov 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Travel	Allot	NAVAIR : PAX RIVER, MD	0.543	0.012	Nov 2017	0.010	Nov 2018	0.010	Nov 2019	-		0.010	Continuing	Continuing	Continuing
Program Management Support	WR	NAWCTSD : ORLANDO, FL	0.089	0.000		0.177	Nov 2018	0.177	Nov 2019	-		0.177	Continuing	Continuing	Continuing
Prior year Mgmt Sup no longer funded in the FYDP	Various	Various : Various	1.462	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	2.492	0.236		0.321		0.311		-		0.311	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	49.516	1.558		1.709		1.700		-		1.700	Continuing	Continuing	N/A

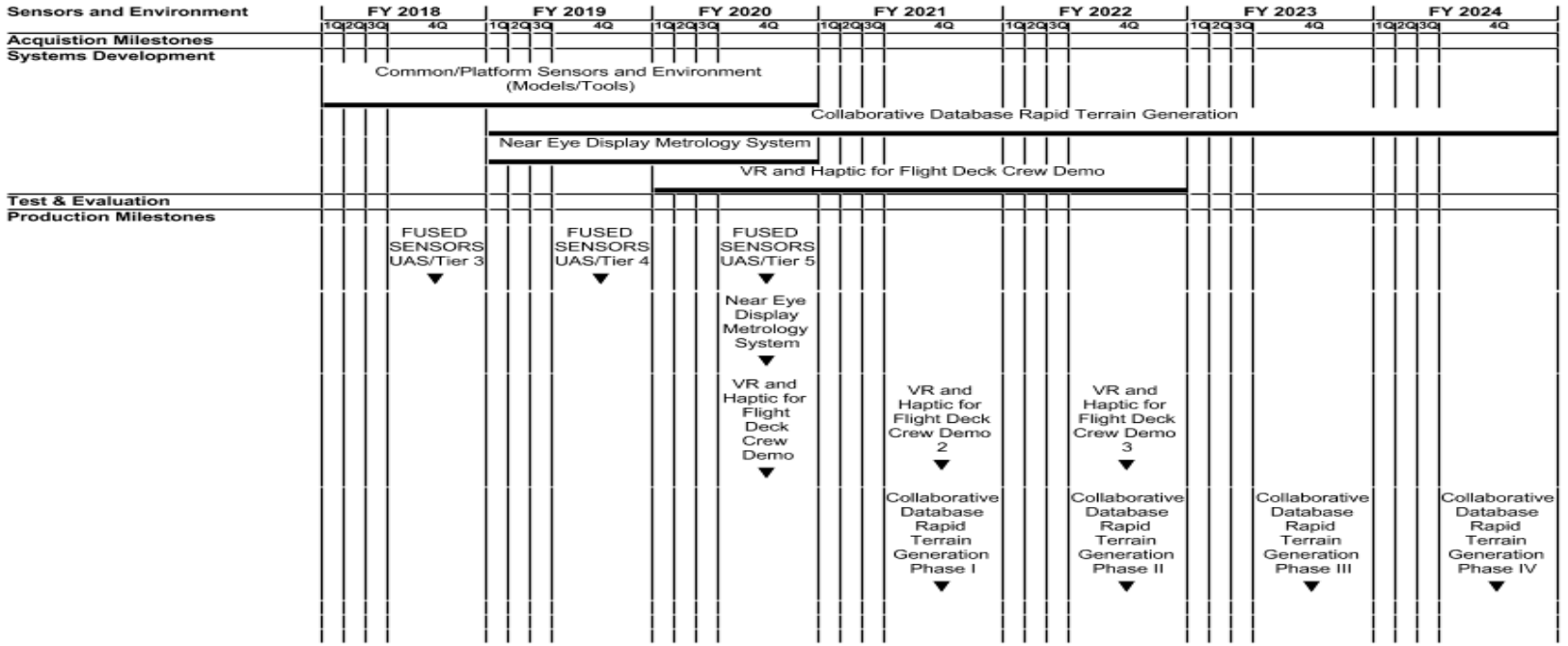
Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 2124 / *Air Warfare Training*



2020DON - 0204571N - 2124

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 2124 / *Air Warfare Training*



2020DON - 0204571N - 2124

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 2124 / *Air Warfare Training*

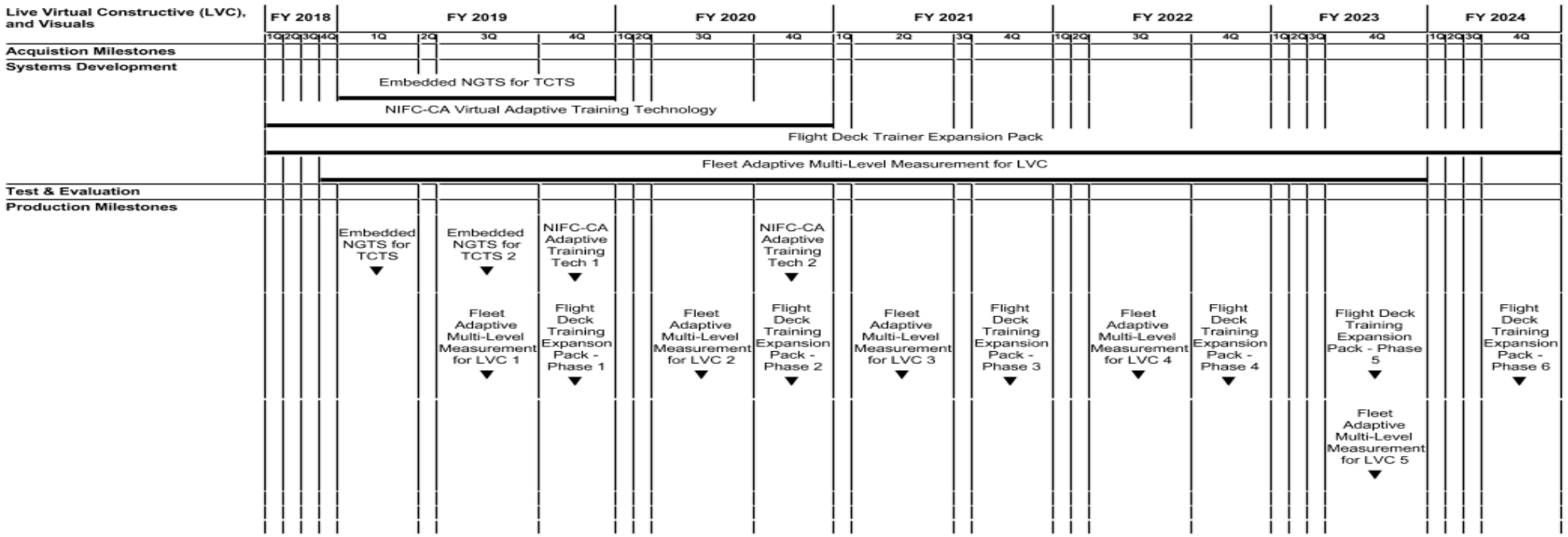


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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 2124 / *Air Warfare Training*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Human/Instructional Systems Integration				
Systems Development: Common Instruction Systems/SAF and Unmanned Aerial Systems Interface Selection and Training Tech Dev	1	2018	4	2019
Systems Development: Augmented Reality/ Virtual Reality/ Mixed Reality Sim Demo	1	2019	4	2021
Systems Development: NGTS Analysis and Reporting	1	2019	4	2022
Systems Development: Crew Enabled Role Player	1	2018	4	2024
Systems Development: T-45 Augmented Reality Visual System (ARVS) Part Task Trainer (PTT)	2	2018	3	2019
Production Milestones: AR/VR/MR Sim Demo 1	4	2019	4	2019
Production Milestones: AR/VR/MR Sim Demo 2	4	2020	4	2020
Production Milestones: AR/VR/MR Sim Demo 3	4	2021	4	2021
Production Milestones: UAS INSTR. SYS Tier I/II 2	4	2018	4	2018
Production Milestones: UAS INSTR. SYS. Tier I/II 3	4	2019	4	2019
Production Milestones: NGTS Analysis and Reporting - Phase I	4	2019	4	2019
Production Milestones: Crew Enabled Role Player - Synthetic Crew Member	4	2020	4	2020
Production Milestones: NGTS Analysis and Reporting - Phase 2	4	2020	4	2020
Production Milestones: Crew Enabled Role Player - Virtual Wingman	4	2021	4	2021
Production Milestones: NGTS Analysis and Reporting - Phase 3	4	2021	4	2021
Production Milestones: NGTS Analysis and Reporting - Phase 4	4	2022	4	2022
Production Milestones: Crew Enabled Role Player - Speech Enabled Synthetic Role Player	4	2023	4	2023
Production Milestones: T-45 Augmented Reality Visual System (ARVS) Part Task Trainer (PTT) 1	2	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: T-45 Augmented Reality Visual System (ARVS) Part Task Trainer (PTT) 2	2	2019	2	2019
Production Milestones: T-45 Augmented Reality Visual System (ARVS) Part Task Trainer (PTT) 3	3	2019	3	2019
Production Milestones: Crew Enabled Role Player - Phase IV	4	2024	4	2024
Sensors and Environment				
Systems Development: Common/Platform Sensors and Environment (Models/Tools)	1	2018	4	2020
Systems Development: Collaborative Database Rapid Terrain Generation	1	2019	4	2024
Systems Development: Near Eye Display Metrology System	1	2019	4	2020
Systems Development: VR and Haptic for Flight Deck Crew Demo	1	2020	4	2022
Production Milestones: FUSED SENSORS UAS/Tier 3	4	2018	4	2018
Production Milestones: FUSED SENSORS UAS/Tier 4	4	2019	4	2019
Production Milestones: FUSED SENSORS UAS/Tier 5	4	2020	4	2020
Production Milestones: Near Eye Display Metrology System	4	2020	4	2020
Production Milestones: VR and Haptic for Flight Deck Crew Demo	4	2020	4	2020
Production Milestones: VR and Haptic for Flight Deck Crew Demo 2	4	2021	4	2021
Production Milestones: VR and Haptic for Flight Deck Crew Demo 3	4	2022	4	2022
Production Milestones: Collaborative Database Rapid Terrain Generation Phase I	4	2021	4	2021
Production Milestones: Collaborative Database Rapid Terrain Generation Phase II	4	2022	4	2022
Production Milestones: Collaborative Database Rapid Terrain Generation Phase III	4	2023	4	2023
Production Milestones: Collaborative Database Rapid Terrain Generation Phase IV	4	2024	4	2024
Live Virtual Constructive (LVC), and Visuals				
Systems Development: Embedded NGTS for TCTS Participant Susbystem	1	2019	4	2019
Systems Development: NIFC-CA Virtual Adaptive Training Technology	1	2018	4	2020
Systems Development: Flight Deck Trainer Expansion Pack	1	2018	4	2024
Systems Development: Fleet Adaptive Multi-Level Measurement for LVC	4	2018	4	2023
Production Milestones: Embedded NGTS for TCTS Participant Subsystem	1	2019	1	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 2124 / *Air Warfare Training*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: Embedded NGTS for TCTS Participant Subsystem 2	3	2019	3	2019
Production Milestones: NIFC-CA Adaptive Training Tech 1	4	2019	4	2019
Production Milestones: NIFC-CA Adaptive Training Tech 2	4	2020	4	2020
Production Milestones: Flight Deck Training Expansion Pack - Phase 1	4	2019	4	2019
Production Milestones: Flight Deck Training Expansion Pack - Phase 2	4	2020	4	2020
Production Milestones: Flight Deck Training Expansion Pack - Phase 3	4	2021	4	2021
Production Milestones: Flight Deck Training Expansion Pack - Phase 4	4	2022	4	2022
Production Milestones: Flight Deck Training Expansion Pack - Phase 5	4	2023	4	2023
Production Milestones: Flight Deck Training Expansion Pack - Phase 6	4	2024	4	2024
Production Milestones: Fleet Adaptive Multi-Level Measurement for LVC 1	3	2019	3	2019
Production Milestones: Fleet Adaptive Multi-Level Measurement for LVC 2	3	2020	3	2020
Production Milestones: Fleet Adaptive Multi-Level Measurement for LVC 3	2	2021	2	2021
Production Milestones: Fleet Adaptive Multi-Level Measurement for LVC 4	3	2022	3	2022
Production Milestones: Fleet Adaptive Multi-Level Measurement for LVC 5	4	2023	4	2023

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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3093: *TACTS/LATR Replacement*	93.570	46.780	56.154	51.245	-	51.245	6.669	3.722	3.792	3.867	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Tactical Combat Training System (TCTS) Increment II will provide an improved environment for air combat training utilizing a secure air-to-air and air-to-ground data link, and will provide rangeless operation capability to Forward Deployed Naval Forces (FDNF). TCTS Increment II will provide encryption and an enhanced threat environment, as well as airborne participant instrumentation for multiple fixed and rotary wing platforms. Engineering Development Model (EDM) units will be developed in FY19 and FY20 and will support Engineering and Developmental Testing events thru FY21. The EDMs will be specifically utilized for testing in the following areas: Environmental Qualification, Software, High Accelerated Lifecycle, Ground System Integration, Airborne Subsystem Air Worthiness and Performance, Shipboard Ground Station, Internal Mount and Rack Mounted Subsystem (Internal Mount) Airworthiness and Performance and JSF Airworthiness and Performance.

Increase in FY20 from previous submission reflects transfer of funding from APN 0725, OPN 4204 for EDM development and test, to include Cross Domain Solution (CDS) and Advanced Weapons Laboratory testing.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: TACTS/LATR REPLACEMENT	46.780	56.154	51.245	0.000	51.245
Articles:	-	41	16	-	16
Description: TCTS: Qualify and complete the On-Range and Rangeless Pod system fielding for all USN Tactical Training Ranges and Carrier Air Wing Five (CVW-5) CVN installation, including the complete Integrated Logistics products and training. Define Test & Training Enabling Architecture (TENA) compliant interface between TCTS and an Advanced Display System (ADS). Develop a Rack- Mounted subsystem for use on rotary wing and transport aircraft. Continue development of the encrypted data link. Develop related training range integration.					
FY 2019 Plans: FY19 includes the completion of Critical Design Review (CDR) and Post Critical Design Review (CDR) assessment for the Airborne Subsystem (POD), Ground Subsystem, Remote Range Unit, and Portable Support Equipment Subsystems. Engineering Development Model (EDM) fabrication of both participant subsystems and ground stations occurs in FY19 to support Developmental Testing (DT) beginning in FY20. FY19 continues steps toward completion of the National Security Agency (NSA) Certification.					
FY 2020 Base Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY20 will include Test Readiness Review (TRR) and a Flight Readiness Review (FRR). These reviews will ensure readiness to start contractor system testing and follow-on government subsystem testing (Developmental Test-B). FY20 will continue steps toward completion of the National Security Agency (NSA) Certification and will include the completion of System Authority to Operate (ATO). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease of $4.909 from FY2019 to FY2020 in TCTS Increment II is due to the completion of Critical Design Review (CDR) and moving into Developmental Testing.					
Accomplishments/Planned Programs Subtotals	46.780	56.154	51.245	0.000	51.245

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/4204: *Weapons Range Support Equipment (WRSE)*	66.941	93.864	101.843	-	101.843	84.035	110.979	112.426	115.771	Continuing	Continuing
• APN/0725: *Other Production Charges/Tactical Combat Training System (TCTS)*	1.463	1.444	0.000	-	0.000	21.184	21.607	22.060	22.502	Continuing	Continuing

Remarks

D. Acquisition Strategy

Tactical Combat Training System will employ an evolutionary incremental acquisition strategy. This strategy will provide for the development of a system that meets the Operational Requirements Document.

E. Performance Metrics

Rockwell Collins, Inc.: National Security Agency (NSA) approved encrypted Data Link Transceiver (DLT). Successful Engineering Development Model testing of encrypted DLT requirements with NSA.

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Development	C/CPIF	ROCKWELL COLLINS, INC : CEDAR RAPIDS, IA	17.462	42.852	Oct 2017	47.333	Oct 2018	41.269	Oct 2019	-		41.269	9.490	158.406	158.406
Prior Year Prod Dev No Longer Funded in the Budget or Out Years	Various	Various : Various	10.901	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	28.363	42.852		47.333		41.269		-		41.269	Continuing	Continuing	N/A

Remarks

Increase in FY20 from previous submission reflects transfer of funding from APN 0725, OPN 4204 for EDM development.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWC-WD : CHINA LAKE, CA	0.961	0.030	Jan 2018	0.000		0.000		-		0.000	0.000	0.991	0.991
Systems Engineering	WR	NAWC-AD : PAX RIVER, MD	9.498	1.535	Jan 2018	3.310	Nov 2018	3.376	Nov 2019	-		3.376	Continuing	Continuing	Continuing
Systems Engineering	C/CPFF	JACOBS ENG : Ridgecrest, CA	0.000	0.000		0.700	Dec 2018	0.000		-		0.000	0.000	0.700	0.700
Systems Engineering	WR	SPAWAR : NORTH CHARLESTON, SC	0.000	0.113	Jun 2018	0.406	Nov 2018	0.000		-		0.000	0.000	0.519	0.519
Systems Engineering	C/CPFF	Calvert Engineering Inc. : Prince Frederick, MD	0.000	0.040	Sep 2018	0.000		0.000		-		0.000	0.000	0.040	0.040
Systems Engineering	C/CPFF	Precise : LEXINGTON PARK, MD	0.000	0.239	Mar 2018	0.087	Nov 2018	0.089	Nov 2019	-		0.089	0.000	0.415	0.415
Logistics	WR	NAWC-AD : PAX RIVER, MD	0.714	0.290	Jan 2018	0.956	Nov 2018	0.975	Nov 2019	-		0.975	Continuing	Continuing	Continuing
Logistics Sup	C/CPFF	Synectic Solutions, Inc. : LEXINGTON PARK, MD	0.164	0.168	Aug 2018	0.173	Aug 2019	0.176	Aug 2020	-		0.176	0.000	0.681	0.681

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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Support No Longer Funded in the Budget or Out Years	Various	Various : Various	28.115	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	39.452	2.415		5.632		4.616		-		4.616	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWC-AD : PAX RIVER, MD	1.938	0.272	Jan 2018	0.892	Nov 2018	0.910	Nov 2019	-		0.910	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	AMRDEC : REDSTONE ARSENAL, AL	0.000	0.002	Oct 2018	0.008	Nov 2018	0.008	Nov 2019	-		0.008	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	GSA : Atlanta, GA	0.000	0.048	Nov 2018	0.258	Jan 2019	0.263	Nov 2019	-		0.263	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	NAWC-WD : China Lake, MD	0.000	0.000		0.000		1.108	Nov 2019	-		1.108	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	NSA : Fort Meade, MD	0.000	0.000		0.000		1.000	Nov 2019	-		1.000	Continuing	Continuing	Continuing
Prior Year T&E No Longer Funded in the Budget or Out Years	Various	Various : Various	3.425	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	5.363	0.322		1.158		3.289		-		3.289	Continuing	Continuing	N/A

Remarks

Increase in Government Developmental Test & Evaluation support from FY2019 to FY2020 to support the Developmental Testing (DT) that will begin in FY2020. This includes funding to NSA for Cross Domain Solution (CDS) testing and funding to NAWCWD for Advanced Weapons Laboratory testing.

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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prog Mgnt Sup	WR	NAWC-AD : PAX RIVER, MD	4.151	1.057	Jan 2018	1.784	Nov 2018	1.820	Nov 2019	-		1.820	Continuing	Continuing	Continuing
Travel	Allot	NAVAIR : PAX RIVER, MD	0.103	0.006	Jan 2018	0.030	Nov 2018	0.030	Nov 2019	-		0.030	Continuing	Continuing	Continuing
Prog Mgnt Sup	C/CPFF	Precise : LEXINGTON PARK, MD	0.079	0.128	Jun 2018	0.217	Feb 2019	0.221	Feb 2020	-		0.221	0.000	0.645	0.645
Prior Year Mgmt No Longer Funded in the Budget or Out Years	Various	Various : Various	16.059	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	20.392	1.191		2.031		2.071		-		2.071	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	93.570	46.780		56.154		51.245		-		51.245	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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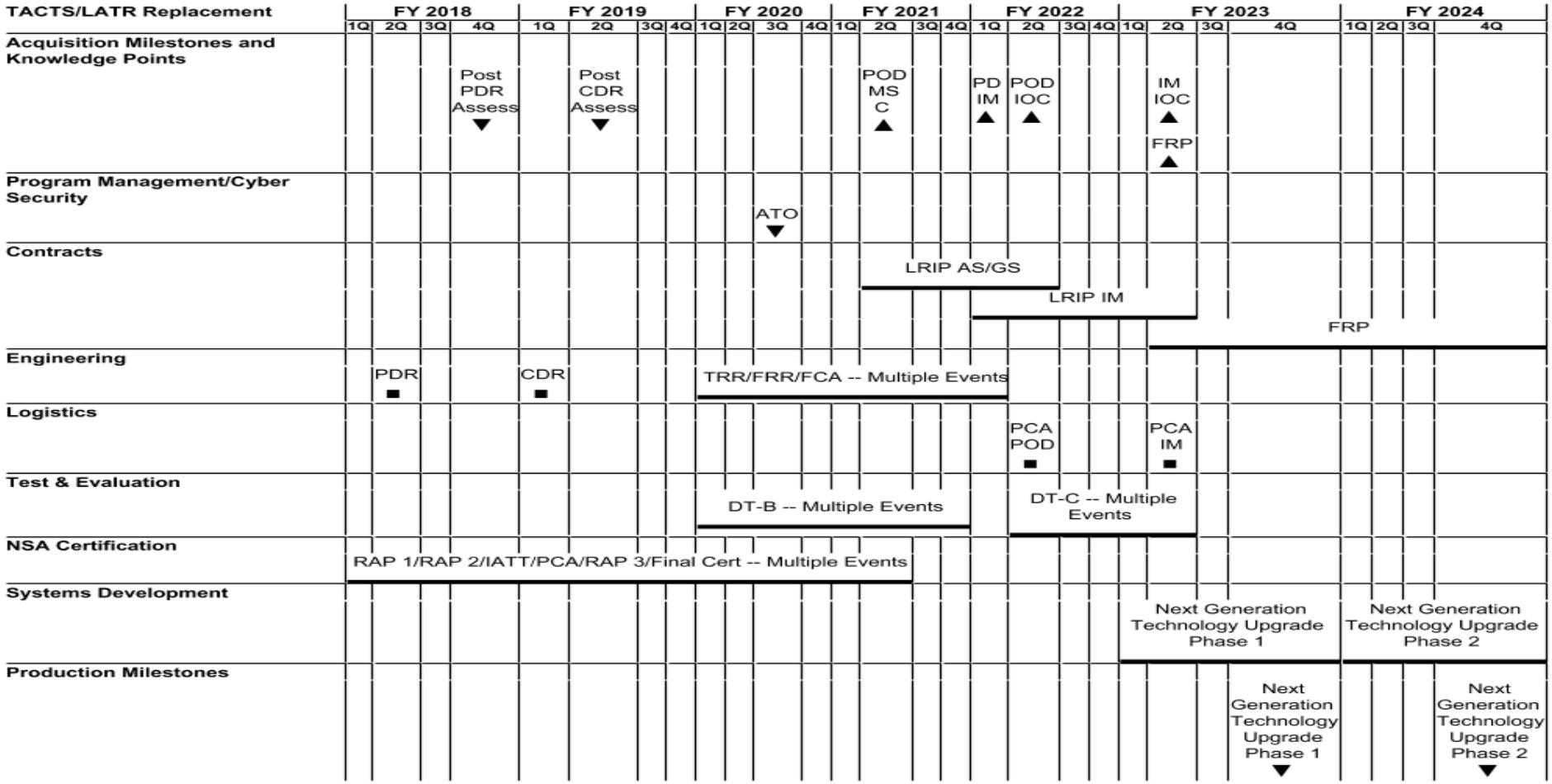

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
TACTS/LATR Replacement				
Acquisition Milestones and Knowledge Points: Post PDR Assessment	4	2018	4	2018
Acquisition Milestones and Knowledge Points: Post CDR Assessment	2	2019	2	2019
Acquisition Milestones and Knowledge Points: POD MS C	2	2021	2	2021
Acquisition Milestones and Knowledge Points: POD IOC	2	2022	2	2022
Acquisition Milestones and Knowledge Points: Production Decision Internal Mount	1	2022	1	2022
Acquisition Milestones and Knowledge Points: Internal Mount IOC	2	2023	2	2023
Acquisition Milestones and Knowledge Points: FRP	2	2023	2	2023
Program Management/Cyber Security: Authority to Operate	3	2020	3	2020
Contracts: LRIP Airborne Subsystem (POD), Ground Subsystem, Remote Range Unit, Portable Support Equipment Subsystem	2	2021	2	2022
Contracts: LRIP Rack-Mounted Internal Mount, JSF Internal Mount	1	2022	2	2023
Contracts: Full Rate Production	2	2023	4	2024
Engineering: Preliminary Design Review	2	2018	2	2018
Engineering: Critical Design Review	1	2019	1	2019
Engineering: Test Readiness Review / Flight Readiness Review / Functional Configuration Audit	1	2020	1	2022
Logistics: Physical Configuration Audit POD	2	2022	2	2022
Logistics: Physical Configuration Audit IM	2	2023	2	2023
Test & Evaluation: Developmental Test B - Multiple Events	1	2020	4	2021
Test & Evaluation: Developmental Test C - Multiple Events	2	2022	2	2023
NSA Certification: RAP 1/RAP 2/IATT/PCA/RAP 3/Final Cert	1	2018	2	2021
Systems Development: Next Generation Technology Upgrade Phase 1	1	2023	4	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Systems Development: Next Generation Technology Upgrade Phase 2	1	2024	4	2024
Production Milestones: Next Generation Technology Upgrade Phase 1	4	2023	4	2023
Production Milestones: Next Generation Technology Upgrade Phase 2	4	2024	4	2024

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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3356: *High Fidelity Surface Trainers*	27.471	1.163	0.756	3.564	-	3.564	1.466	0.000	0.000	0.000	0.000	34.420
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This line funds high fidelity Aegis Integrated Air and Missile Defense (IAMD) individual, instructor, strike group and team trainers to support all Advanced Capability Build (ACB) and below Aegis baselines. This line provides funds for development of a High Fidelity Aegis Combined Integrated Air and Missile Defense (IAMD) and Anti-Submarine Warfare (ASW) Trainer (CIAT) to enable advanced warfare training (AWT) Phase II objectives to be accomplished ashore and to support Active and Passive Sonar Operations, Target Motion Analysis, Sonobuoy Localization, Command and Control, and execution of ASW Kill chain. Funds are provided for advanced component technology development, prototype evaluation, and technology readiness level assessment. Development of these trainers is in response to CNO Wholeness Review and Department of the Navy requirements. This line also provides funds for the research and development of enabling technologies required to meet Train to Qualify (T2Q) and Train to Certify (T2C) requirements for the Vertical Takeoff Unmanned Aerial Vehicle (VTUAV) and testing towards the integration with the Littoral Combat Ships (LCS) Integrated Tactical Trainers. This line also provides funds for research and development of updates to the Surface Navigation Maintenance Technician Training course of instruction. This line supports Surface Training Advanced Virtual Environment (STAVE) methodology by researching and developing trainers that will create an immersive and interactive learning environment and support both CNO High Velocity Learning and Ready Relevant Learning intent.

NOTE: In FY18, Mine Warfare Synthetic Training requirements previously captured within PE 0204571N / Proj 3356 (High Fidelity Surface Trainer) were realigned to PE 0603502N Surface & Shallow Water MCM / Proj 1235 (Mine Warfare Planning and Analysis).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Combined IAMD ASW Trainer (CIAT)	0.607	0.156	0.200	0.000	0.200
Articles:	-	-	-	-	-
FY 2019 Plans: Test and integrate developed models prior to system installation. Research and develop models to integrate into the system which would keep pace with emergent tactical capabilities in the Fleet such as Electronic Warfare and NIFC-CA enhancements.					
FY 2020 Base Plans: Complete research and development for supporting Aegis BL 9.2 within CIAT architecture. Evaluate computing equipment alternatives for CIAT V2 configuration. Evaluate Operating Environment (OE) network configuration					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
updates required for CIAT V2 configuration. Perform critical experiments as needed for CIAT V2. Update appropriate Subsystem Requirements Documents for CIAT V2. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 funding increase of $.044 supports Resource Sponsor direction to perform requirements analysis, development and validation, preliminary design and prototyping of advanced and enabling technologies for the Advanced Capability Build (ACB) 15 / Advanced Capability Build (ACB) 16 Phase 0 and Phase 1 into the Combined Integrated Air Missile Defense/Anti Surface Warfare Trainer (CIAT) V2 trainer.					
Title: LCS Navy Training System Plan (NTSP) Execution ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Resources will be used perform research required for the development of enabling technologies required to meet Train to Qualify (T2Q) and Train to Certify (T2C) requirements for the Vertical Takeoff Unmanned Aerial Vehicle (VTUAV) and testing towards the integration with the Littoral Combat Ships (LCS) Integrated Tactical Trainers. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 increase in this funding line is required to meet Train to Qualify (T2Q) and Train to Certify (T2C) objectives for the Vertical Takeoff Unmanned Aerial Vehicle (VTUAV) and testing towards the integration with the Littoral Combat Ships (LCS) Integrated Tactical Trainers. This unique training capability is needed to satisfy current and future fleet operational commitments and missions.	0.000 -	0.000 -	1.200 -	0.000 -	1.200 -
Title: Air Defense Strike Group Facility ***Articles:*** ***FY 2019 Plans:*** Research and develop VACSSim simulators and CEC Engagement Processor (CEP) Simulators to integrate within the Integrated Training Facility (ITF) Engineering Development Model (EDM). Additional functionality to VACSSim will be researched and developed to include additional AEGIS Baselines and submodes. These	0.556 -	0.600 -	1.764 -	0.000 -	1.764 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
simulators will integrate with NAVAIR simulators (E2D, F35) to create an overarching simulation environment that will be the only way to train Carrier Strike Groups on high-end threats and capabilities related to Naval Integrated Fire Control Counter Air (NIFC-CA). The ITF capabilities are a requirement of the NIFC-CA Flag Steering Committee and part of the CNO-directed Fleet Training Wholeness effort. ***FY 2020 Base Plans:*** Continue to research and develop VACSSim simulators and CEP Simulators to integrate within the ITF. This will include Baseline 7.1 and Ballistic Missile Defense 4.0 Development. The ITF capabilities are a requirement of the Naval Integrated Fire Control Counter Air (NIFC-CA) Flag Steering Committee and part of the CNO-directed Fleet Training Wholeness effort. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 funding increase supports the continued research and development required to deliver advanced and enabling technologies for upgrades to the Virtual AEGIS Combat System Simulator (VACSSim) in support of the Joint Integrated and Air Missile Defense (JIAMD) Mission. Efforts include extensive system testing and the introduction of a Cooperative Engagement Capability (CEC) simulation capability for integrated warfare training and is aligned to the CNO directed Live, Virtual and Constructive (LVC) training initiative.					
Title: Navigation Systems Technician (NAVSYSTECH) Capacity	0.000	0.000	0.400	0.000	0.400
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** Research and develop updates to the Surface Navigation Maintenance Technician Training course of instruction. The Navigation System Maintenance Trainer supports system level operations and maintenance level training at CSCS Unit Dam Neck, VA. Develop Navigation Systems Technician (NAVSYSTECH) simulator to integrate field changes to the system for modernized course performance objectives. Design and develop training solutions that include GPS-Based Positioning, Navigation and Timing Service (GPNTS) modernization. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY20 funding increase supports surface navigation operator and maintainer training requirement delineated in Navy Training System Plans for Global Positioning System (GPS) - Based Positioning, Navigation and Timing Service (GPNTS) AN/SSN-9(V) and Surface Navigation System. Funds are provided to perform requirements analysis, development and validation, critical investigations, preliminary design and prototyping of advanced and enabling technologies for the purpose of introducing GPNTS training systems of systems navigation training as an upgrade. GPNTS provides modernized pervasive, robust, secure, integrated, and shipboard interoperable net-centric PNT capabilities. The upgraded surface navigation system of systems training solution architecture fully aligns to the Surface Training community's investments in high fidelity integrated navigation systems trainer and the CNO directed Live, Virtual and Constructive (LVC) training initiative.					
Accomplishments/Planned Programs Subtotals	1.163	0.756	3.564	0.000	3.564

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The software development and advanced technology upgrades for High Fidelity Surface Trainers are accounted for in this RDT&E line. These upgrades will provide an enabling technology to an existing training system.

E. Performance Metrics

Naval Surface Warfare Center Dahlgren: Approved Combined IAMD and ASW Trainer (CIAT). Successful engineering development model (EDM) introducing advanced technologies necessary to simulate/stimulate the AEGIS Combat System elements required for operators stated in AEGIS Ashore Baseline 9 Weapons Specification (WS) 21200 series.

Naval Surface Warfare Center Dahlgren: Incorporation of approved legacy Aegis baselines (7.2, 6.3) into the Virtual Aegis Combat System Simulator (VACSSim). Incorporation of additional sub-modes into the VACSSim. Successful integration of VACSSim and CEP Workstation into the Integrated Training Facility simulation architecture.

Naval Surface Warfare Center Carderock: Approved Combined IAMD & ASW Trainer (CIAT). Successful engineering development model introducing advanced technologies necessary to 1) simulate performance of AN/SQQ-89A(V)15 sonar system in alignment with fielding plan for initial Sonar software versions with capability to receive AN/SQQ-89A(V)15 coordinated routine modernizations and 2) replicate Combat Information Center (CIC) configuration and functionalities representative of AEGIS Baseline 9.

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Naval Undersea Warfare Center Newport: Approved Combined IAMD & ASW Trainer (CIAT). Develop ASW components to be integrated in the CIAT system for Technology Requirements Model (TRM) simulation of own ship and threat torpedoes, and emulations of sonar devices.

NAWCTSD: Completed development of enabling technologies required to meet T2Q and T2C requirements for the VTUAV and successful integration with the LCS Integrated Tactical Trainers. Completed updates to the Surface Navigation Maintenance Technician Training course of instruction.

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SYSTEMS ENG	WR	NSWC DAHLGREN : DAHLGREN,VA	17.239	0.895	Nov 2017	0.756	Dec 2018	0.400	Nov 2019	-		0.400	0.200	19.490	Continuing
SYSTEMS ENG	WR	NSWC CARDEROCK : CARDEROCK, MD	6.052	0.268	Nov 2017	0.000		0.000		-		0.000	0.000	6.320	-
SYSTEMS ENG	WR	NUWC NEWPORT : NEWPORT, RI	2.076	0.000		0.000		0.000		-		0.000	0.000	2.076	-
SYSTEMS ENG	MIPR	U.S. ARMY SMDC : HUNTSVILLE, AL	0.147	0.000		0.000		0.000		-		0.000	0.000	0.147	-
SYSTEMS ENG	WR	NAWCTSD : ORLANDO, FL	1.957	0.000		0.000		1.600	Nov 2019	-		1.600	0.000	3.557	-
SYSTEMS ENG	TBD	LOCKHEED MARTIN : TBD	0.000	0.000		0.000		1.564	Nov 2019	-		1.564	1.258	2.822	Continuing
		Subtotal	27.471	1.163		0.756		3.564		-		3.564	1.458	34.412	N/A

Remarks

FY20 funding increase supports the following:

1) Resource Sponsor direction to perform requirements analysis, development and validation, preliminary design and prototyping of advanced and enabling technologies for the Advanced Capability Build (ACB) 15 / Advanced Capability Build (ACB) 16 Phase 0 and Phase 1 into the Combined Integrated Air Missile Defense/Anti Surface Warfare Trainer (CIAT) V2 trainer.

2) Continued research and development required to deliver advanced and enabling technologies for upgrades to the Virtual AEGIS Combat System Simulator (VACSSim) in support of the Joint Integrated and Air Missile Defense (JIAMD) Mission. Efforts include extensive system testing and the introduction of a Cooperative Engagement Capability (CEC) simulation capability for integrated warfare training and is aligned to the CNO directed Live, Virtual and Constructive (LVC) training initiative.

3) Funding required to meet Train to Qualify (T2Q) and Train to Certify (T2C) objectives for the Vertical Takeoff Unmanned Aerial Vehicle (VTUAV) and testing towards the integration with the Littoral Combat Ships (LCS) Integrated Tactical Trainers. This unique training capability is needed to satisfy current and future fleet operational commitments and missions.

4) Surface navigation operator and maintainer training requirement delineated in Navy Training System Plans for Global Positioning System (GPS) - Based Positioning, Navigation and Timing Service (GPNTS) AN/SSN-9(V) and Surface Navigation System. Funds are provided to perform requirements analysis, development and validation, critical investigations, preliminary design and prototyping of advanced and enabling technologies for the purpose of introducing GPNTS training systems of systems navigation training as an upgrade. GPNTS provides modernized pervasive, robust, secure, integrated, and shipboard interoperable net-centric PNT capabilities. The upgraded surface navigation system of systems training solution architecture fully aligns to the Surface Training community's investments in high fidelity integrated navigation systems trainer and the CNO directed Live, Virtual and Constructive (LVC) training initiative.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204571N / *Consolidated Trng Sys Dev*	Project (Number/Name) 3356 / *High Fidelity Surface Trainers*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	27.471	1.163		0.756		3.564		-		3.564	1.458	34.412	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 3356 / *High Fidelity Surface Trainers*

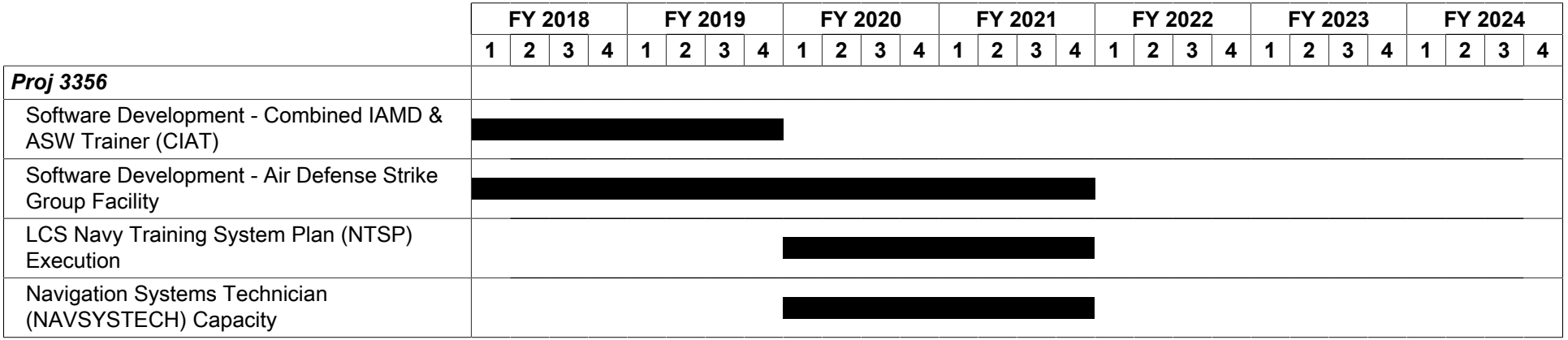


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204571N / *Consolidated Trng Sys Dev*	**Project (Number/Name)** 3356 / *High Fidelity Surface Trainers*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3356				
Software Development - Combined IAMD & ASW Trainer (CIAT)	1	2018	4	2019
Software Development - Air Defense Strike Group Facility	1	2018	4	2021
LCS Navy Training System Plan (NTSP) Execution	1	2020	4	2021
Navigation Systems Technician (NAVSYSTECH) Capacity	1	2020	4	2021

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204574N *I Cryptologic Direct Support*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	22.791	2.355	4.544	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	29.690
3091: *Advanced Cryptological Sys Eng (CCOP)*	22.791	2.355	4.544	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	29.690

A. Mission Description and Budget Item Justification

Funding for the following project has been realigned out of PE 0204574N into PE 0304785N as part of Program Element Consolidation starting in FY20: Project 3091 (Advanced Cryptological Sys Eng).

The Advanced Cryptologic Systems Engineering - The Cryptologic Carry-on Program (CCOP) rapidly develops and fields state-of-the-art signal acquisition capabilities in response to Combatant Command requirements for a quick-reaction surface cryptologic carry-on capability. There are 124 cryptologic capable surface ships and shore sites in the current Navy inventory; each of these is a potential user of this carry-on equipment, depending on deployment schedules and the tempo of operations. In addition, numerous Navy and Coast Guard platforms are other potential users.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	1.155	4.544	4.514	-	4.514
Current President's Budget	2.355	4.544	0.000	-	0.000
Total Adjustments	1.200	0.000	-4.514	-	-4.514
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	1.200	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	-4.514	-	-4.514

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204574N / *Cryptologic Direct Support*	Project (Number/Name) 3091 / *Advanced Cryptological Sys Eng (CCOP)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3091: *Advanced Cryptological Sys Eng (CCOP)*	22.791	2.355	4.544	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	29.690
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Funding has been realigned out of PE 0204574N Project 3091, into PE 0304785N as part of RDTE PE Consolidation starting in FY20.

A. Mission Description and Budget Item Justification

The Advanced Cryptologic Systems Engineering - Cryptologic Carry On Program (CCOP) rapidly develops and fields state-of-the-art signal acquisition capabilities in response to Combatant Command requirements for a quick-reaction surface, subsurface and airborne cryptologic carry-on capability. There are approximately 124 cryptologic capable surface ships and shore sites in the current Navy inventory; each is a potential user of this carry-on equipment, depending on deployment schedules and the tempo of operations. In addition, there are other numerous Naval platforms(including U.S. Coast Guard and USNs) that could serve as potential users. This funding line provides resources to enable rapid transition of available Commercial Off-The-Shelf (COTS) and Government Off -The-Shelf (GOTS) technologies that apply to Fleet requirements for carry-on system functionalities. These technologies typically require various levels of integration to leverage on-board systems providing system and mission management, product reporting, and data analysis. COTS / GOTS system documentation and training materials require adaptation or modification to meet fleet operator requirements, or entirely new training materials may need to be developed. Prior to operational deployment, systems must be systematically tested to ensure suitable and reliable operation, tested for network vulnerabilities if connected to shipboard Local Area Networks, and tested relative to interoperability requirements. Certification testing is conducted to meet Office of Naval Intelligence security requirements, and network testing is conducted in accordance with Information Technology (IT) requirements to allow connection to Navy networks. Funding will also provide resources to address rapid deployment of enhancements or improvements to the common hardware and/or software baseline of all other carry-on subsystems to meet emergent requirements. Funding will support development and integration efforts to fuse data produced and distributed by Shipboard IW / Information Operations (IO) systems with other intelligence data at multiple classification levels which is then provided to shipboard combat systems to support kinetic (bombs, mortars, missiles, bullets, etc.) and non-kinetic fires (electronic attack, lasers, cyber) in order to enable a more agile, effective and complete exploitation of the electromagnetic spectrum.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Advanced Cryptological Sys Eng - CCOP	2.355	4.544	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: Continue to integrate, test, and document identified COTS and GOTS technologies and subsystems that meet emergent and on-going Fleet requirements as specified in the SOI and target threat list, as well as, continue to develop upgrades to existing systems and subsystems according to Fleet requirements. Funds aid the					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204574N / *Cryptologic Direct Support*	**Project (Number/Name)** 3091 / *Advanced Cryptological Sys Eng (CCOP)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
development of new signal processing algorithms and software based solutions to enable rapid transition of capability to permanently installed SSES systems, including SSEE Family of Systems (FoS) and its variants, the research of self-contained small form factor systems for Patrol craft and other small units, and the research of Adaptive Mission Modules for rapid insertion to counter specific threats or provide intelligence in specific areas of operation. FY19 funds will also initiate engineering and software development of the next generation Red Falcon capabilities using common data formatting and hardware backplane standards. ***FY 2020 Base Plans:*** FY20 funding has been realigned to PE 0304785N Project 3091 as part of PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0304785N Project 3091.					
Accomplishments/Planned Programs Subtotals	2.355	4.544	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN / 3501: *Cryptologic Communications Equipment*	23.935	16.137	9.510	-	9.510	9.968	11.108	11.371	11.604	0.000	186.362
• RDTEN/0304785N: *Tactical Cryptologic Systems*	0.000	0.000	4.515	-	4.515	4.630	4.686	4.835	4.932	Continuing	Continuing

Remarks

D. Acquisition Strategy

Acquisition, management, and contracting strategies support engineering and manufacturing development by providing funds to Space and Naval Warfare Systems Centers Atlantic and Pacific (SPAWARSYSCTR), and miscellaneous contractors with management oversight by SPAWAR.

E. Performance Metrics

Cryptologic Carry On Program (CCOP) delivers state-of-the-art signal acquisition software for CCOP systems in response to Combatant Command requirements for a quick-reaction surface, subsurface and airborne cryptologic carry-on capability.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204574N / *Cryptologic Direct Support*	Project (Number/Name) 3091 / *Advanced Cryptological Sys Eng (CCOP)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development	Various	Various : Various	6.109	0.000		0.000		0.000		-		0.000	0.000	6.109	-
Software Development	C/CPFF	Classified Contract : Classified Contract	6.160	1.480	Jan 2018	2.856	Jan 2019	0.000		-		0.000	0.000	10.496	-
Software Development	WR	SSC PAC : San Diego, CA	2.315	0.290	Nov 2017	0.560	Nov 2018	0.000		-		0.000	0.000	3.165	-
Software Development	WR	SSC LANT : Charleston, SC	1.764	0.150	Nov 2017	0.289	Nov 2018	0.000		-		0.000	0.000	2.203	-
		Subtotal	16.348	1.920		3.705		0.000		-		0.000	0.000	21.973	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	Various	Various : Various	1.915	0.000		0.000		0.000		-		0.000	0.000	1.915	-
Systems Engineering	C/CPFF	Classified Contract : Classified Contract	1.591	0.230	Jan 2018	0.444	Jan 2019	0.000		-		0.000	0.000	2.265	-
		Subtotal	3.506	0.230		0.444		0.000		-		0.000	0.000	4.180	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	Various	Various : Various	0.991	0.000		0.000		0.000		-		0.000	0.000	0.991	-
Developmental Test & Evaluation	WR	SSC LANT : Charleston, SC	0.000	0.095	Nov 2017	0.183	Nov 2018	0.000		-		0.000	0.000	0.278	-
		Subtotal	0.991	0.095		0.183		0.000		-		0.000	0.000	1.269	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204574N / *Cryptologic Direct Support*	**Project (Number/Name)** 3091 / *Advanced Cryptological Sys Eng (CCOP)*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services Prior Years	Various	Various : Various	1.273	0.000		0.000		0.000		-		0.000	0.000	1.273	-
Program Management Support	WR	SSC PAC : San Diego, CA	0.673	0.110	Nov 2017	0.212	Nov 2018	0.000		-		0.000	0.000	0.995	-
		Subtotal	1.946	0.110		0.212		0.000		-		0.000	0.000	2.268	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	22.791	2.355		4.544		0.000		-		0.000	0.000	29.690	N/A

Remarks

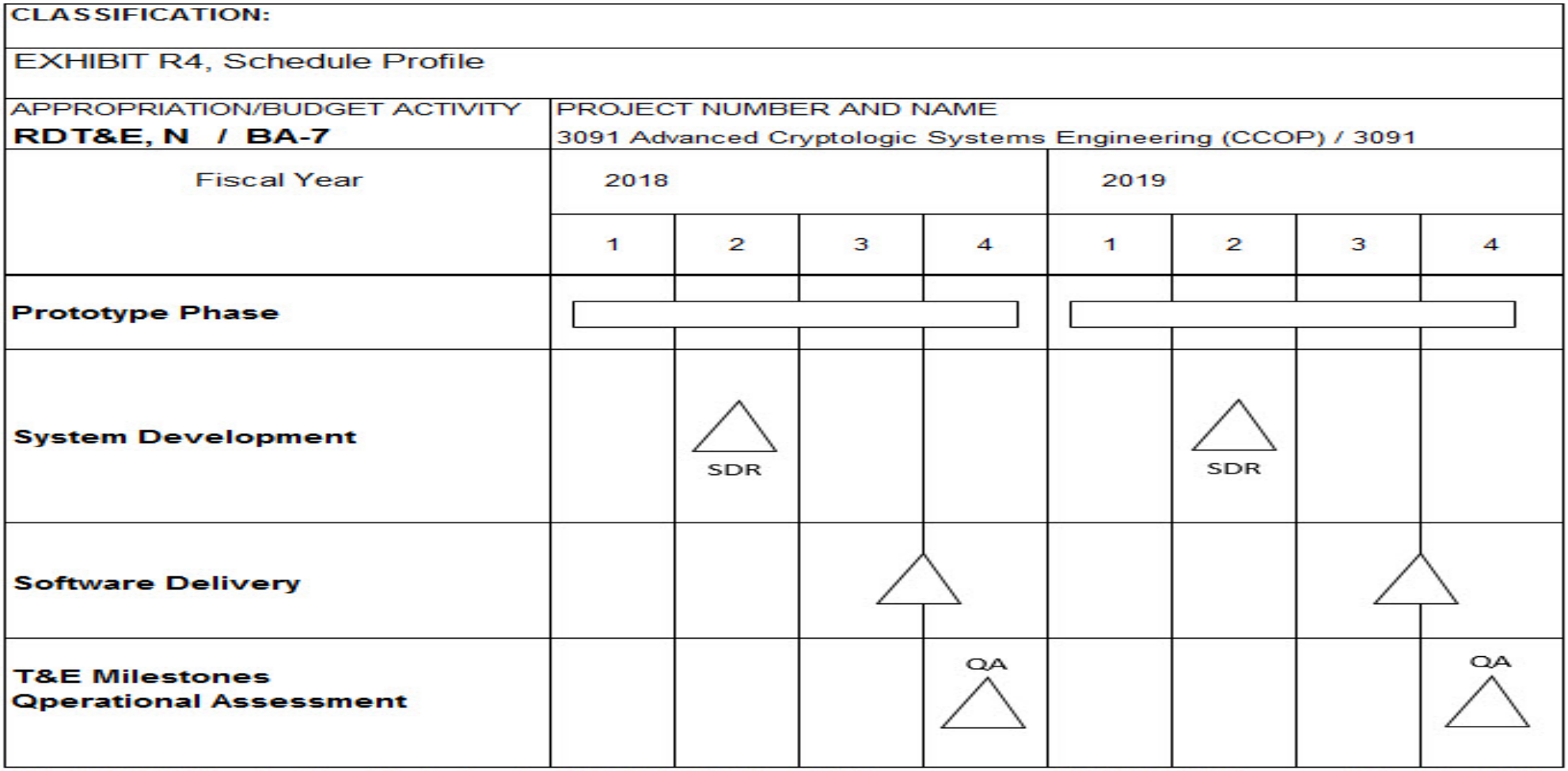
FY20 cost data is provided under PE 0304785N Project 3091.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204574N / *Cryptologic Direct Support*	**Project (Number/Name)** 3091 / *Advanced Cryptological Sys Eng (CCOP)*

CLASSIFICATION:

EXHIBIT R4, Schedule Profile

APPROPRIATION/BUDGET ACTIVITY	PROJECT NUMBER AND NAME
RDT&E, N / BA-7	3091 Advanced Cryptologic Systems Engineering (CCOP) / 3091



Efforts in FY20 and out are funded under PE 0304785N Proj 3091.

Exhibit R-4, Program Schedule Profile

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204574N / *Cryptologic Direct Support*	**Project (Number/Name)** 3091 / *Advanced Cryptological Sys Eng (CCOP)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3091				
Prototype Phase - 2018	1	2018	4	2018
Prototype Phase - 2019	1	2019	4	2019
System Design Review (SDR) - 2018	2	2018	2	2018
System Design Review (SDR) - 2019	2	2019	2	2019
Software Delivery - 2018	3	2018	4	2018
Software Delivery - 2019	3	2019	4	2019
Operational Assessment (OA) - 2018	4	2018	4	2018
Operational Assessment (OA) - 2019	4	2019	4	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0204575N *I Elect Warfare Readiness Supt*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	125.813	49.094	66.889	82.325	-	82.325	116.872	118.284	115.524	116.991	Continuing	Continuing
2263: *Information Warfare System*	125.813	31.492	47.049	38.709	-	38.709	50.589	51.613	49.495	50.542	Continuing	Continuing
2958: *Cyberspace Activities*	0.000	0.000	0.000	29.000	-	29.000	43.000	44.000	45.000	45.000	Continuing	Continuing
3426: *Maritime Cyber*	0.000	17.602	19.840	14.616	-	14.616	23.283	22.671	21.029	21.449	Continuing	Continuing

A. Mission Description and Budget Item Justification

Information Warfare Systems (2263) - This budget item funds: research and development (R&D) activities; vulnerability analysis and reverse engineering of emerging threats and targets; specialized technical, engineering and management capabilities; program office and program management support contracts, engineering support, modeling and simulation, administrative and security personnel; a classified administrative network that provides the capability to track and manage the Command's projects, contracts, and financials with appropriate security mechanisms to protect the information and data; focused radio frequency (RF) collection missions to expose potential vulnerabilities and identify new signals of interest for future countermeasure development; operation, sustainment and support of Development Network environment(s) and test environment enabling USN and USCC requirements; identification, development and testing of electronic attack countermeasures; Configuration Management Authority, delegated from Commander, TENTH Fleet, which reviews, validates, publishes, and maintains the standard for signal-specific software for tactical Navy RF collectors; support facilities and apparatus at various locations; logistics support costs associated with R&D activities. (Details held at a higher classification).

Cyberspace Activities (2958) - Navy is developing foundational tools in support of the Cyber Mission Force, in accordance with requirements, guidance, and previous work completed by USCYBERCOM Capabilities Development Group (CDG). This is a new project beginning in FY20 (Details held at a higher classification).

Maritime Cyber (3426) - This budget item funds: research and development activities; intelligence analysis and linguistic support; reverse engineering and vulnerability assessment; radio frequency (RF) testing; program office support; Agile development operations expertise and training. (Details held at a higher classification).

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0204575N *I Elect Warfare Readiness Supt*		
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	51.040	66.889	68.893	-	68.893
Current President's Budget	49.094	66.889	82.325	-	82.325
Total Adjustments	-1.946	0.000	13.432	-	13.432
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.946	0.000			
• Program Adjustments	0.000	0.000	-15.568	-	-15.568
• Rate/Misc Adjustments	0.000	0.000	29.000	-	29.000

Change Summary Explanation

The FY 2020 funding request or project 2263, Information Warfare System, was reduced by $7.556 million to account for the availability of prior year execution balances. Also, funding was decreased due to reduction of efforts to discover vulnerabilities in adversary systems as well as develop and field effective countermeasures, Electronic Support (ES), Electronic Attack (EA) and cyber capabilities against prioritized adversary signals, networks, and target sets.

The FY 2020 funding request or project 3426, Maritime Cyber, was reduced by $5.161 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204575N / *Elect Warfare Readiness Supt*	Project (Number/Name) 2263 / *Information Warfare System*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2263: *Information Warfare System*	125.813	31.492	47.049	38.709	-	38.709	50.589	51.613	49.495	50.542	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Information Warfare (IW) program office develops a deep understanding of potential adversaries and systems, identifies vulnerabilities, and conducts research and development efforts that lead to delivery of effects in support of Fleet Operations Plans. It uses iterative, flexible and adaptive processes that leverage intelligence, operations and acquisition authorities, projects and deliverables through Milestone B. The IW program office delivers capabilities at all classification levels that deny, degrade, deceive, disrupt or destroy adversaries' ability to find and target US systems and platforms. These deliverables contribute to the tactical, operational and strategic options available to Fleet and Combatant Commanders. (Details held at a higher classification).

This budget item funds:
- Research and Development (R&D) activities
- Vulnerability analysis and reverse engineering of emerging threats and targets
- Program office and program management support contracts, engineering support, modeling and simulation, administrative and security personnel
- Specialized technical, engineering and management capabilities
- A classified administrative network that provides the capability to track and manage the Command's projects, contracts, and financials with appropriate security mechanisms to protect the information and data
- Focused radio frequency (RF) collection missions to expose potential vulnerabilities and identify new signals of interest for future countermeasure development
- Operation, sustainment and support of Development Network environment(s) and test environment enabling USN and USCC requirements
- Identification, development and testing of electronic attack countermeasures
- Configuration Management Authority, delegated from Commander, TENTH Fleet, which reviews, validates, publishes, and maintains the standard for signal-specific software for tactical Navy RF collectors
- Support facilities and apparatus at various locations
- Logistics support costs associated with R&D activities

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Electronic Warfare / Information and Computer Network Operations (IO & CNO) and Countermeasure Capability Research & Development	31.492	47.049	38.709	0.000	38.709
Articles:	-	-	-	-	-
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2263 / *Information Warfare System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Detailed information that is not normally collected and reported by the national intelligence apparatus is needed to conduct vulnerability assessments. Strategic and operational signals of interest require two terrestrial sites with large antennas to collect and process data. The site in CONUS is unique, and provides exquisite insights into potential adversary systems. (Details available at a higher classification.) The overseas site's capability is being expanded across radio frequency bands. (Details available at a higher classification.) Tactical R&D of signals of interest will be performed by the HAWKEYE systems, which underwent technology refresh annually to keep up with the dynamic and evolving signals environment. System upgrades and new capabilities will be added to expand collection for electronic and communications intelligence. (Details available at a higher classification.) Collect unknown or previously unrecorded signals will be processed by the Global Signals Analysis Lab for identification and reporting. Hardware and software upgrades to two labs will provide increased processing speed, shared bandwidth for data exchange between sites, and state of the art analysis capability as part of a phased technology refresh. As new signals are understood, maritime collection systems will be updated with software configuration files that drive the embedded software-defined radios to recognize and collect new targets. VIRTUAL SHOCKWAVE deliver a simulated environment for descriptor file development from multiple theaters simultaneously. Configuration management will be maintained by the command, and those signal files will be then leveraged to build a range of active techniques for non-kinetic fires. SHOCKWAVE III is a technology upgrade to develop fires that remain compatible with the afloat programs of record to continue to keep pace with the adversary. Vulnerability assessment require specific technical linguistic and engineering expertise in addition to general intelligence analysis. Contracting that expertise provides the needed flexibility to get the right focus on each project. (Details available at a higher classification.) VIRTUOSO will complete transition to SSEE program of record for deployment across the fleet. (Details available at a higher classification.) ***FY 2020 Base Plans:*** Investments will continue in intelligence discovery from terrestrial locations and afloat systems, with the intent of identifying adversary vulnerabilities and building Information Warfare (IW) capabilities. At the OCONUS site, equipment upgrades and mission and maintenance activities continue, keeping pace with adversary					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2263 / *Information Warfare System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
improvements. IW program office will conduct approximately five target development afloat missions. When new signals are identified, IW program office will validate newly developed software for delivery to all afloat forces for prosecution, keeping pace with adversary capabilities. Program will maintain the database with all signal descriptor files for targets that afloat forces can prosecute. With this knowledge, IW program office will develop, test and field tactical electronic attack options based upon Fleet requirements and priorities for delivery to individual platforms. A study will leverage VIRTUOSO to determine the feasibility of expanding an existing IW technique against a more general set of targets in the same and other frequency bands. (Details available at higher classification.) Program office will begin to reconstitute a robust modeling and simulation capability that supports analysis, development and testing of Information Warfare capabilities throughout their lifecycle, beginning with physics and engineering models. Program office will continue to contract for information technology services. A specialized support team to operate and maintain the software development network environments used by the Navy's tool developers will mature. Rather than sustaining a Command network that allows processing of multiple classifications (SCI and limited access), program office will outsource our requirement, completing our transition to the U.S. Army's special access network. Program office will continue to deliver program management, acquisition management and systems engineering activities, as well as sustainment and operations of support facilities at various locations. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request or project 2263, was reduced by $7.556 million to account for the availability of prior year execution balances. Also, funding was decreased due to the reduction of efforts to discover vulnerabilities in adversary systems as well as develop and field effective countermeasures, Electronic Support (ES), Electronic Attack (EA) and cyber capabilities against prioritized adversary signals, networks, and target sets.					
Accomplishments/Planned Programs Subtotals	31.492	47.049	38.709	0.000	38.709

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2263 / *Information Warfare System*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Projects under this program are designated non-ACAT. Defense Acquisition Program Models described in Department of Defense Instruction (DoDI) 5000.2 and guidance are the starting basis used with tailored approaches for the unique character of the product being acquired or the need for accelerated acquisition to streamline acquisition processes as appropriate.

E. Performance Metrics

Measures include quality and impact of new ideas and approaches; the success of the technology application in satisfying Combatant Commanders and Fleet requirements; and successful cost effective transition of capabilities to operational systems. The goal of these investments is to provide non-kinetic options to Commanders to influence adversaries and prevent escalation of crises. Qualitative measures are used initially, then through development of modeling and simulation scenarios and capabilities, transition to quantitative metrics. Success heavily depends upon insight and feedback obtained through various intelligence community efforts and results.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2263 / *Information Warfare System*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development	Various	Classified : Classified	38.652	6.452	Oct 2017	16.830	Oct 2018	16.830	Oct 2019	-		16.830	Continuing	Continuing	Continuing
Engineering	MIPR	JHU APL : Not Specified	14.817	0.350	Oct 2017	0.661	Oct 2018	0.661	Oct 2019	-		0.661	Continuing	Continuing	Continuing
Development	WR	NRL : Washington, DC	13.923	8.669	Oct 2017	8.341	Oct 2018	8.341	Oct 2019	-		8.341	Continuing	Continuing	Continuing
Technical Data	C/CPFF	Various : various	0.400	0.355	Oct 2017	1.430	Oct 2018	1.157	Oct 2019	-		1.157	Continuing	Continuing	Continuing
Hardware/Equipment	Various	DLA, NSA, NAVAIR, GSA : NCR	5.500	1.393	Oct 2017	1.393	Oct 2018	1.384	Oct 2019	-		1.384	Continuing	Continuing	Continuing
System Engineering	WR	NRL : Washington, DC	19.750	1.153	Oct 2017	0.650	Oct 2018	0.650	Oct 2019	-		0.650	Continuing	Continuing	Continuing
Engineering	Various	Classified : Classified	9.053	1.903	Oct 2017	2.024	Oct 2018	2.024	Oct 2019	-		2.024	Continuing	Continuing	Continuing
Software	Various	Classified : Classified	2.743	0.200	Oct 2017	0.268	Oct 2018	0.000		-		0.000	Continuing	Continuing	Continuing
Program	C/CPFF	OakleaSimpon : Ft. Meade	0.000	0.237	May 2018	0.523	Oct 2018	0.523	Oct 2019	-		0.523	Continuing	Continuing	Continuing
		Subtotal	104.838	20.712		32.120		31.570		-		31.570	Continuing	Continuing	N/A

Remarks

Realigned items to product development which were previously incorrectly classified under Support, testing or Program Management.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software	WR	NRL : Wash DC	0.956	0.139	Nov 2017	0.143	Nov 2018	0.143	Nov 2019	-		0.143	Continuing	Continuing	Continuing
Software	WR	SPAWAR : San Diego CA	1.221	0.900	Nov 2017	3.270	Nov 2018	0.000	Nov 2019	-		0.000	Continuing	Continuing	Continuing
Studies/Analysis	WR	NPS : Monterey CA	0.500	0.300	Nov 2017	0.300	Nov 2018	0.300	Nov 2019	-		0.300	Continuing	Continuing	Continuing
Program Support	MIPR	Army : Not Specified	2.100	2.500	Oct 2017	2.300	Oct 2018	1.600	Oct 2019	-		1.600	Continuing	Continuing	Continuing
Logistics	Various	NAVFAC : MIDLANT VA	0.359	0.102	Oct 2017	0.132	Oct 2018	0.111	Oct 2019	-		0.111	Continuing	Continuing	Continuing
		Subtotal	5.136	3.941		6.145		2.154		-		2.154	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204575N / *Elect Warfare Readiness Supt*	Project (Number/Name) 2263 / *Information Warfare System*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

CDLs are required for Command Personnel to drive Command Vehicles supporting the installation of mission hardware as part of logistics.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mod & Sim	Various	Contract : Classified	3.852	1.850	Oct 2017	2.275	Oct 2018	2.275	Oct 2019	-		2.275	Continuing	Continuing	Continuing
Operational Test & Evaluation	Various	Various : Various	0.427	0.355	Oct 2017	1.052	Oct 2018	0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	4.279	2.205		3.327		2.275		-		2.275	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Services	Various	Classified : Classified	11.560	4.634	Oct 2017	5.457	Oct 2018	2.710	Oct 2019	-		2.710	Continuing	Continuing	Continuing
		Subtotal	11.560	4.634		5.457		2.710		-		2.710	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	125.813	31.492		47.049		38.709		-		38.709	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2263 / *Information Warfare System*

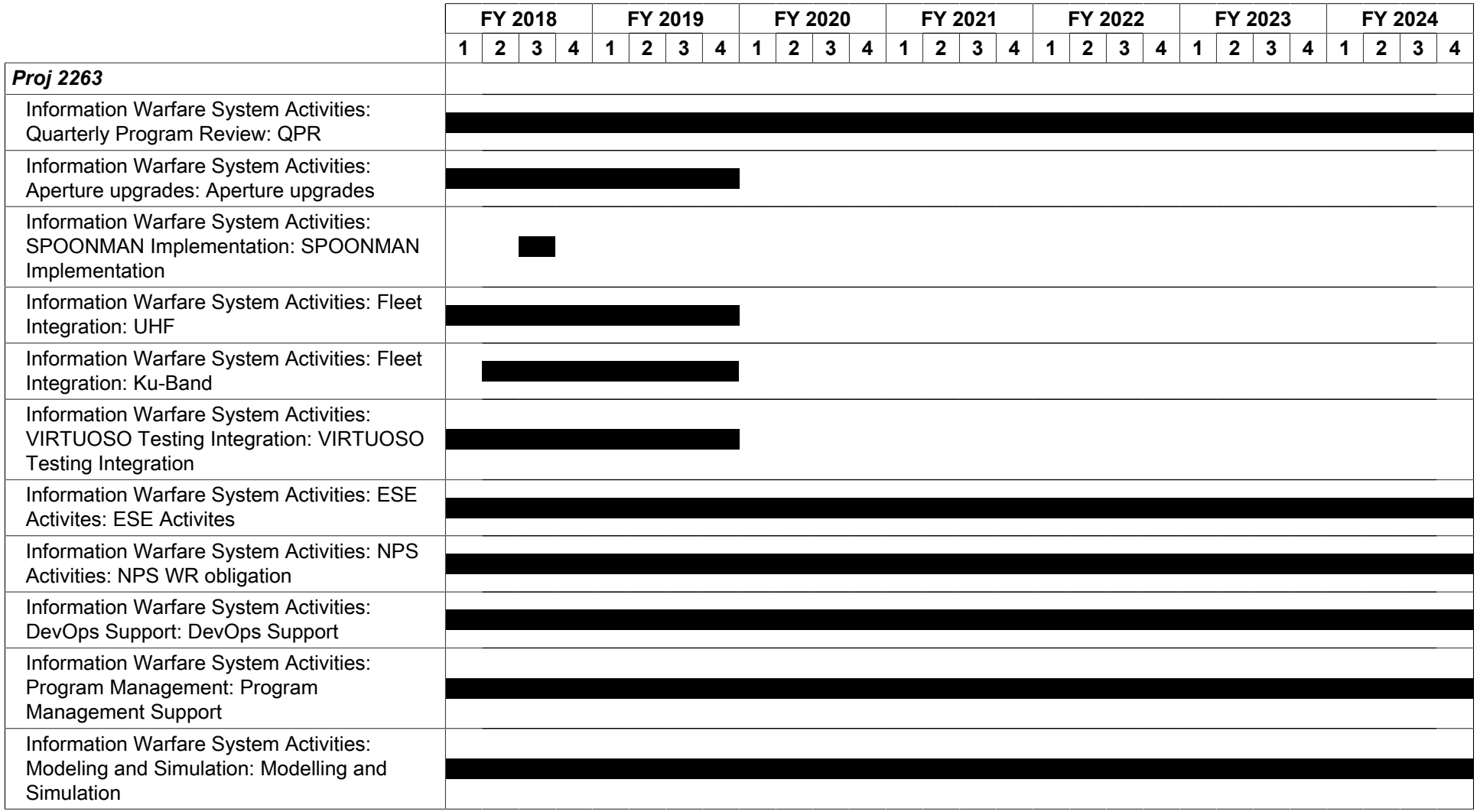

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2263 / *Information Warfare System*

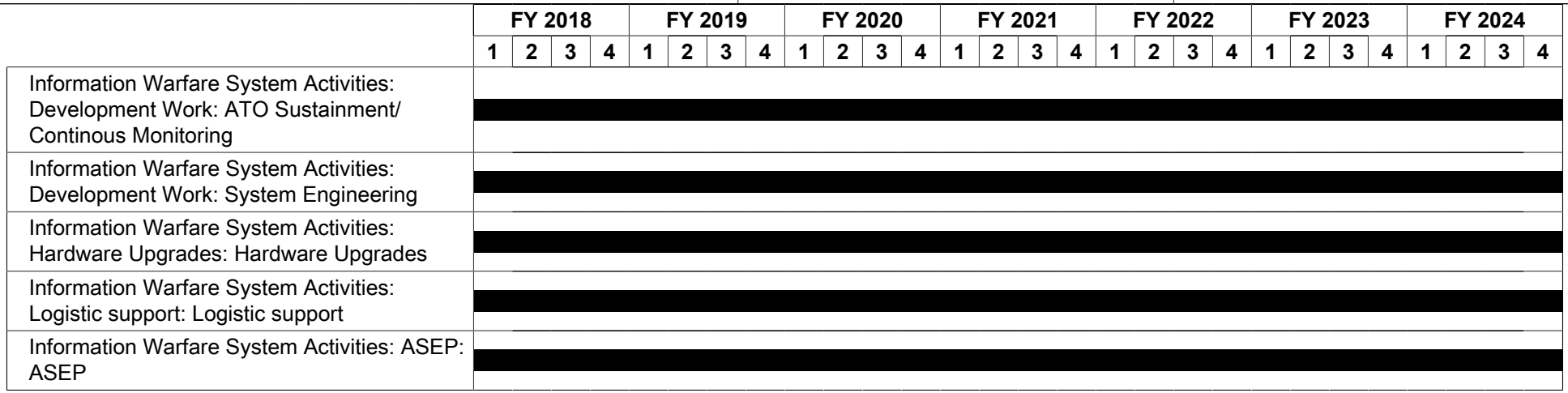

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2263 / *Information Warfare System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2263				
Information Warfare System Activities: Quarterly Program Review: QPR	1	2018	4	2024
Information Warfare System Activities: Aperture upgrades: Aperture upgrades	1	2018	4	2019
Information Warfare System Activities: SPOONMAN Implementation: SPOONMAN Implementation	3	2018	3	2018
Information Warfare System Activities: Fleet Integration: UHF	1	2018	4	2019
Information Warfare System Activities: Fleet Integration: Ku-Band	2	2018	4	2019
Information Warfare System Activities: VIRTUOSO Testing Integration: VIRTUOSO Testing Integration	1	2018	4	2019
Information Warfare System Activities: ESE Activites: ESE Activites	1	2018	4	2024
Information Warfare System Activities: NPS Activities: NPS WR obligation	1	2018	4	2024
Information Warfare System Activities: DevOps Support: DevOps Support	1	2018	4	2024
Information Warfare System Activities: Program Management: Program Management Support	1	2018	4	2024
Information Warfare System Activities: Modeling and Simulation: Modelling and Simulation	1	2018	4	2024
Information Warfare System Activities: Development Work: ATO Sustainment/ Continous Monitoring	1	2018	4	2024
Information Warfare System Activities: Development Work: System Engineering	1	2018	4	2024
Information Warfare System Activities: Hardware Upgrades: Hardware Upgrades	1	2018	4	2024
Information Warfare System Activities: Logistic support: Logistic support	1	2018	4	2024
Information Warfare System Activities: ASEP: ASEP	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204575N / *Elect Warfare Readiness Supt*	Project (Number/Name) 2958 / *Cyberspace Activities*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2958: *Cyberspace Activities*	0.000	0.000	0.000	29.000	-	29.000	43.000	44.000	45.000	45.000	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Navy is developing foundational tools in support of the Cyber Mission Force in accordance with requirements, guidance, and previous work completed. (Details held at a higher classification).

This budget item funds:
- Cyberspace support facilities, infrastructure lease and fit-up of additional space
- Program office and program management support contracts, engineering support, administrative and security personnel
- Specialized Cyberspace technical, engineering and management capabilities
- Expand Cyberspace Activities development network and network support
- Cyberspace hardware and software reverse engineering activities
- Research and Development (R&D) activities
- Cyberspace tool development
- Cyberspace activity logistics support costs associated with R&D activities

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Cyberspace Activities	0.000	0.000	29.000	0.000	29.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: Cyberspace Activities investments in infrastructure, support, and research to begin developing foundational tools in support of the Cyber Mission Force in accordance with requirements, guidance, and previous work completed. Initiate expansion and establishment of Cyberspace tool support facilities, infrastructure fit-up of space with required hardware, software, network, and network support. Initiate Program office and program management support contracts, engineering, administrative and security personnel support. Begin specialized Cyberspace technical, engineering, and management capabilities development and expand Cyberspace Activities development network and network support. Begin Cyberspace hardware and software reverse engineering activities and research to develop Cyberspace tools.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2958 / *Cyberspace Activities*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The focus will be expeditionary cyber capability and non-recurring engineering begin with developing the necessary hardware and software for collection of unique targets in the maritime domain by expeditionary forces. (Details available at a higher classification.) ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** This is a new project beginning in FY20.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	29.000	0.000	29.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Projects under this program are designated non-ACAT. Defense Acquisition Program Models described in Department of Defense Instruction (DoDI) 5000.2 and guidance are the starting basis used with tailored approaches for the unique character of the product being acquired or the need for accelerated acquisition to streamline acquisition processes as
appropriate.

E. Performance Metrics

Measures include quality and impact of new ideas and approaches; the success of the technology application in satisfying Combatant Commanders and Fleet requirements; and successful cost effective transition of capabilities to operational systems. The goal of these investments is to provide non-kinetic options to Commanders to influence adversaries and prevent escalation of crises. Qualitative measures are used initially, then through development of modeling and simulation scenarios and capabilities, transition to quantitative metrics. Success heavily depends upon insight and feedback obtained through various intelligence community efforts and results.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2958 / *Cyberspace Activities*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development	Various	Various : Various	0.000	0.000		0.000		9.701	Oct 2019	-		9.701	Continuing	Continuing	Continuing
Engineering	C/CPFF	Classified : Classified	0.000	0.000		0.000		3.500	Oct 2019	-		3.500	Continuing	Continuing	Continuing
Hardware/Equipment	C/CPFF	Classified : Classified	0.000	0.000		0.000		1.200	Oct 2019	-		1.200	Continuing	Continuing	Continuing
System Engineering	C/CPFF	Classified : Classified	0.000	0.000		0.000		0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing
Program	C/CPFF	Classified : Classified	0.000	0.000		0.000		0.450	Oct 2019	-		0.450	Continuing	Continuing	Continuing
Software	C/CPFF	Classified : Classified	0.000	0.000		0.000		0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		15.551		-		15.551	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Support	Various	Various : Various	0.000	0.000		0.000		1.613	Oct 2019	-		1.613	Continuing	Continuing	Continuing
Program Infrastructure Support	C/BA	Not Specified : Not Specified	0.000	0.000		0.000		9.254	Oct 2019	-		9.254	0.000	9.254	-
Logistics	Various	Classified : Classified	0.000	0.000		0.000		0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		11.067		-		11.067	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mod, Sim, and Testing	Various	Contract : Various	0.000	0.000		0.000		0.850	Oct 2019	-		0.850	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.850		-		0.850	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2958 / *Cyberspace Activities*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Mgmt Servies	Various	Classified : Classified	0.000	0.000		0.000		1.532	Oct 2019	-		1.532	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		1.532		-		1.532	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		29.000		-		29.000	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2958 / *Cyberspace Activities*

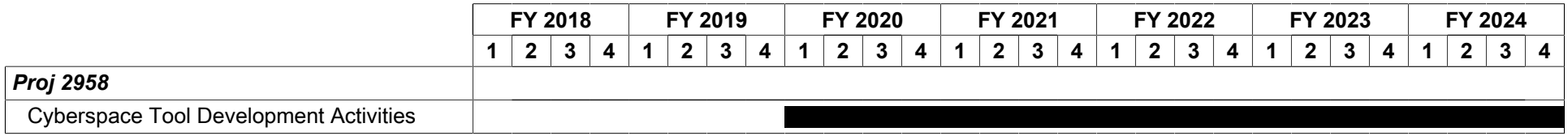

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 2958 / *Cyberspace Activities*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2958				
Cyberspace Tool Development Activities	1	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204575N / *Elect Warfare Readiness Supt*	Project (Number/Name) 3426 / *Maritime Cyber*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3426: *Maritime Cyber*	0.000	17.602	19.840	14.616	-	14.616	23.283	22.671	21.029	21.449	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

For effective and efficient Information Warfare (IW) software development and constant professional development, software developers require a dynamic and agile workspace and equipment that keeps pace with emerging technology. Development and testing networks at all classifications are required.

Driven by intelligence analysis, vulnerability identification and reverse engineering in a laboratory environment that makes use of virtual, emulated and live systems is the necessary first step to developing any capability. Agile development processes deliver usable capabilities after short sprint cycles. Capabilities are tested in controlled environments ranging from a lab to Fleet exercises and demonstrations.

This budget item funds:
- research and development activities
- intelligence analysis and linguistic support
- reverse engineering and vulnerability assessment
- radio frequency (RF) testing
- program office support
- Agile/development operations expertise and training

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Maritime Cyber	17.602	19.840	14.616	0.000	14.616
Articles:	-	-	-	-	-
FY 2019 Plans: Maritime cyber effects development requires a state of the art facility equipped with a reconfigurable space, a hardware lab, and software development capacity at multiple classification levels. Industry standard practices for software development, risk assessment, and collateral impact require a development network at each classification level, a separate test network with the ability to generate a representative environment, and the ability to conduct testing with hardware in the loop. Extension of a Title 10 network allows for future cyber reconnaissance and surveillance, and provides the Navy a basic capability against which to maintain readiness for future cyber warfare. (Details available at a higher classification.)					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 3426 / *Maritime Cyber*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Contract additional expertise which enable capability development and delivery. In support of standing requirements, efforts focus on delivery and sustainment of a non-kinetic effect that can potentially hold a target at risk during all phase of operations. (Details available at a higher classification.) ***FY 2020 Base Plans:*** Reverse engineering efforts will ramp up, focus on a variety of cyber physical systems. Research will begin to identify system characteristics and vulnerabilities, develop executable codes to perform objective operations, and explore options for data collection and transmission to fully utilize spectrums and methods not intended by users in the communication bands and systems. (Details available at higher classification.) All capabilities will be tested in lab and representative environments in an agile development environment on an approximately monthly sprint cycle. Research will continue into future options for Navy's Title X network and alignment with Unified Platform. (Details available at higher classification.) Intelligence analysis and linguistic contracts continue to facilitate engineering and operational understanding of adversary capabilities, and software developers will augment Command forces pending successful recruitment, training and retention initiatives. (Details available at higher classification.) Software capabilities are being developed and delivered to operational forces to assist in further development or to hold potential targets at risk. (Details available at higher classification.) ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request or project 3426, Maritime Cyber, was reduced by $5.161 million to account for the availability of prior year execution balances.					
Accomplishments/Planned Programs Subtotals	17.602	19.840	14.616	0.000	14.616

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 3426 / *Maritime Cyber*

D. Acquisition Strategy

Projects under this program are designated non-ACAT. Defense Acquisition Program Models described in Department of Defense Instruction (DoDI) 5000.2 and guidance are the starting basis used with tailored approaches for the unique character of the product being acquired or the need for accelerated acquisition to streamline acquisition processes as appropriate.

E. Performance Metrics

Measures include quality and impact of new ideas and approaches; the success of the technology application in satisfying Combatant Commanders and Fleet requirements; and successful cost effective transition of capabilities to operational systems. The goal of these investments is to provide non-kinetic options to Commanders to influence adversaries and prevent escalation of crises. Qualitative measures are used initially, then through development of modeling and simulation scenarios and capabilities, transition to quantitative metrics. Success heavily depends upon insight and feedback obtained through various intelligence community efforts and results.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 3426 / *Maritime Cyber*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	Various	Classified : Classified	0.000	8.400	Nov 2017	8.400	Nov 2018	3.464	Nov 2019	-		3.464	Continuing	Continuing	Continuing
System Engineering	Various	APL, DOE, NRL, INL : Various	0.000	4.923	Dec 2017	3.961	Dec 2018	2.646	Dec 2019	-		2.646	Continuing	Continuing	Continuing
		Subtotal	0.000	13.323		12.361		6.110		-		6.110	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program	C/CPFF	Classified : Classified	0.000	0.288	Nov 2017	0.297	Nov 2018	0.306	Nov 2019	-		0.306	Continuing	Continuing	Continuing
Studies & Analysis	Various	Various : Classified	0.000	3.991	Nov 2017	7.182	Nov 2018	8.200	Nov 2019	-		8.200	Continuing	Continuing	Continuing
		Subtotal	0.000	4.279		7.479		8.506		-		8.506	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	17.602		19.840		14.616		-		14.616	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 3426 / *Maritime Cyber*

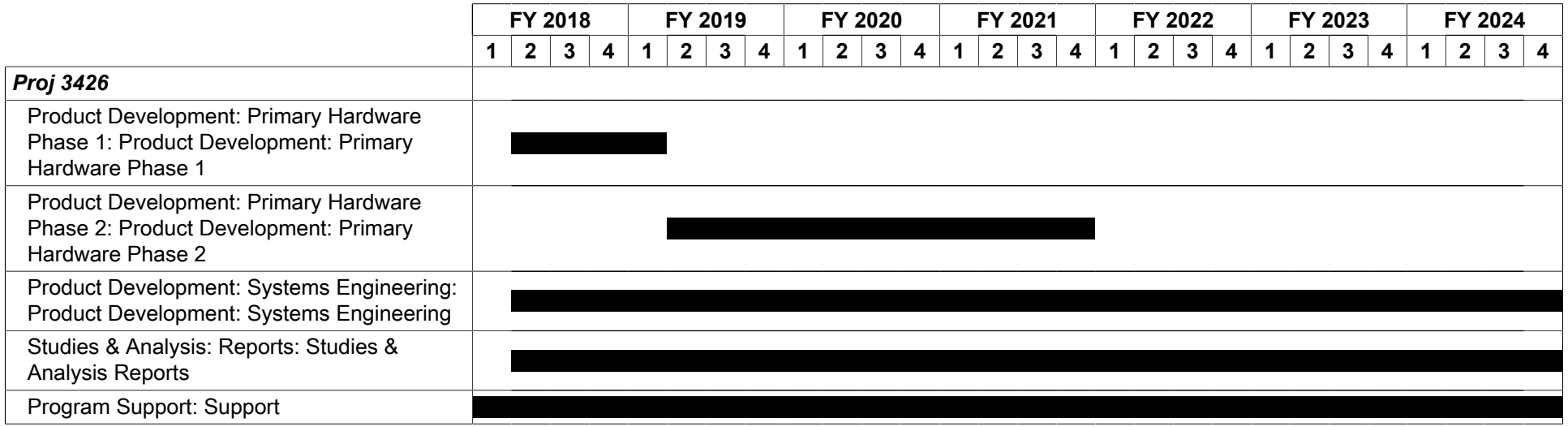

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204575N / *Elect Warfare Readiness Supt*	**Project (Number/Name)** 3426 / *Maritime Cyber*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3426				
Product Development: Primary Hardware Phase 1: Product Development: Primary Hardware Phase 1	2	2018	1	2019
Product Development: Primary Hardware Phase 2: Product Development: Primary Hardware Phase 2	2	2019	4	2021
Product Development: Systems Engineering: Product Development: Systems Engineering	2	2018	4	2024
Studies & Analysis: Reports: Studies & Analysis Reports	2	2018	4	2024
Program Support: Support	1	2018	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205601N *I Harm Improvement*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	811.851	70.415	120.762	138.431	-	138.431	67.887	46.716	54.374	60.593	Continuing	Continuing
1780: *HARM Improvement*	51.724	6.396	6.256	7.105	-	7.105	7.090	7.104	7.239	7.383	Continuing	Continuing
2185: *AARGM*	721.810	14.798	15.266	11.677	-	11.677	11.192	4.787	4.886	4.985	Continuing	Continuing
2189: *AARGM ER*	38.317	49.221	99.240	119.649	-	119.649	49.605	34.825	42.249	48.225	Continuing	Continuing

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 368

A. Mission Description and Budget Item Justification

Research, Development, Test and Evaluation funding for the Joint Service Anti-Radiation Missile (ARM) program, which will include near and far term performance improvements, cost reduction, and studies that establish future development requirements. Specific initial efforts include lower cost seeker component development and seeker aided fuzing to enhance warhead performance in low angle impacts and against certain ship targets.

JUSTIFICATION FOR BUDGET ACTIVITY: These projects are funded under Operational Systems Development because they include development efforts to upgrade systems that have been fielded or have received approval for full-rate production and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	87.989	120.762	116.451	-	116.451
Current President's Budget	70.415	120.762	138.431	-	138.431
Total Adjustments	-17.574	0.000	21.980	-	21.980
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-7.200	0.000			
• SBIR/STTR Transfer	-2.454	0.000			
• Program Adjustments	0.000	0.000	22.355	-	22.355
• Rate/Misc Adjustments	0.000	0.000	-0.375	-	-0.375
• Congressional Directed Reductions Adjustments	-7.920	-	-	-	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205601N *I Harm Improvement*

Change Summary Explanation

Project Unit 1780: FY 2020 funding increase is to support increased Developmental Test & Evaluation at NAWCWD China Lake, CA for the ARM Foreign Material Assessment (FMA) project.

Project Unit 2185: FY 2020 funding decrease is due to the phasing of M Code development and Software Development efforts.

Project Unit 2189: FY 2020 funding increase is due to the commencement of Developmental Test & Evaluation and the Early Operational Assessment (EOA).

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 1780 / *HARM Improvement*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1780: *HARM Improvement*	51.724	6.396	6.256	7.105	-	7.105	7.090	7.104	7.239	7.383	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Anti-Radiation Missile (ARM) Improvement is a combination of the Navy-led High Speed Anti-Radiation Missile (HARM) program and the Advanced Anti-Radiation Guide Missile (AARGM) program. The HARM program has undergone several Engineering Change Plans since ceasing production in 1983. Currently, the inventory consists of AGM-88B/C missiles with Block 5/A software which provides increased capability tracking emitters, improved targeting against a larger set of air defense related systems and an improved seeker. HARM is a Navy led joint service program with the United States Air Force. AARGM is a program derived from a Small Business Innovative Research (SBIR) program that developed a dual mode guidance section, incorporating a Millimeter Wave (MMW) radar with an advanced anti-radiation homing seeker. This provides the capability to counter shutdown of emitters. Additional capability for AARGM consists of Global Positioning System (GPS) capability, MMW terminal guidance, netted targeting real time feed via Integrated Broadcast System (IBS), Weapon Impact Assessment (WIA), GPS point-to-point weapon engagement and impact avoidance zone/missile impact zones.

ARM Improvement efforts require periodic updates to the user data base based on changing threat parameters, enhanced air defense engagement tactics and emerging systems. These funds provide the opportunity to conduct ground and flight testing against foreign systems, called Foreign Material Assessment (FMA). The result of FMA is an analytical report on findings, updates to fleet tactics manuals, curriculum changes to the Suppression of Enemy Air Defenses / Destruction of Enemy Air Defenses lead Air Combat Training Curriculum course work and weapon school tactics/training and procedure briefs. FMA is focused on air defense weapon system and non-traditional target exploitation, analysis and subsequent integration and response to ensure that the AGM-88 ARM weapon systems remains relevant in the planned operational environment.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: ARM Foreign Material Assessment (FMA)	6.396	6.256	7.105	0.000	7.105
Articles:	-	-	-	-	-
FY 2019 Plans: The FMA team will continue to conduct FMA testing (both ground-based and captive flight testing), data analysis, and systems engineering to maximize AARGM and HARM effectiveness against threat air defense systems in FY 2019. The expanded capabilities of the AARGM from the legacy HARM will take advantage of the additional lab capabilities to compliment already existing HARM lab capabilities. This will enable digital Anti-Radiation Homing (ARH) seeker and Millimeter Wave (MMW) terminal seeker assessment which are unique capabilities to AARGM. FMA assessments will remain focused on new threat systems as they become available for evaluation as well as theater/country-specific systems of interest. Priorities coordinated through the Fleet ARM Steering Committee. Expect continued testing and evaluation on advanced Surface-to-Air weapons and related IADS,					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 1780 / *HARM Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
jammers, and ARM countermeasures, and non-traditional ARM targets. Fleet engagement will continue as a key element of testing, engineering, and analytical efforts, which includes funding for threat assessment, operational updates, and integration efforts. Additional test priorities include characterizing complex systems in the field, so that FMA assessments can directly populate missile threat data libraries with updated attributes to enhance track quality for HARM and AARGM. Assess special projects developmental improvements against foreign material. ***FY 2020 Base Plans:*** The FMA team will continue to conduct FMA testing (both ground-based and captive flight testing), data analysis, and systems engineering to maximize AARGM and HARM effectiveness against threat air defense systems in FY 2020. The expanded capabilities of the AARGM from the legacy HARM will take advantage of the additional lab capabilities to compliment already existing HARM lab capabilities. This will enable digital Anti-Radiation Homing (ARH) seeker and Millimeter Wave (MMW) terminal seeker assessment which are unique capabilities to AARGM. FMA assessments will remain focused on new threat systems as they become available for evaluation as well as theater/country-specific systems of interest. Priorities coordinated through the Fleet ARM Steering Committee. Expect continued testing and evaluation on advanced Surface-to-Air weapons and related IADS, jammers, and ARM countermeasures, and non-traditional ARM targets. Fleet engagement will continue as a key element of testing, engineering, and analytical efforts, which includes funding for threat assessment, operational updates, and integration efforts. Additional test priorities include characterizing complex systems in the field, so that FMA assessments can directly populate missile threat data libraries with updated attributes to enhance track quality for AARGM and HARM. Assess special projects developmental improvements against foreign material. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase due to increased testing requirements and capabilities at Naval Air Warfare Center Weapons Division (NAWCWD) China Lake, CA.					
Accomplishments/Planned Programs Subtotals	6.396	6.256	7.105	0.000	7.105

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 1780 / *HARM Improvement*

D. Acquisition Strategy

ARM system updates are provided through the System Support Activity (SSA) at Naval Air Warfare Center - Weapons Division (NAWCWD), China Lake, CA. ARM fleet priorities are set by the Fleet ARM Steering Committee.

E. Performance Metrics

Continue FMA testing and engineering analysis against new and evolving foreign threats.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 1780 / *HARM Improvement*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCWD : China Lake, CA	6.876	1.752	Nov 2017	1.668	Nov 2018	1.679	Nov 2019	-		1.679	Continuing	Continuing	Continuing
Systems Engineering	Various	Various : Various	0.000	0.300	Dec 2017	0.300	Dec 2018	0.306	Dec 2019	-		0.306	0.000	0.906	-
Prior Year Prod Dev no longer funded in FYDP	Various	Various : Various	24.732	0.000		0.000		0.000		-		0.000	0.000	24.732	-
		Subtotal	31.608	2.052		1.968		1.985		-		1.985	Continuing	Continuing	N/A

Remarks

FY 2020 funding supports manpower required for data collection and analysis resulting from field testing.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Eval	WR	NAWCWD : China Lake, CA	1.004	4.149	Nov 2017	4.093	Nov 2018	4.921	Nov 2019	-		4.921	Continuing	Continuing	Continuing
Prior Year Dev T&E no longer funded in FYDP	Various	Various : Various	18.701	0.000		0.000		0.000		-		0.000	0.000	18.701	-
		Subtotal	19.705	4.149		4.093		4.921		-		4.921	Continuing	Continuing	N/A

Remarks

FY 2020 funding supports AARGM and HARM field testing and increased laboratory testing enabled by previous investments in AARGM laboratory capabilities.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	0.000	0.185	Nov 2017	0.185	Nov 2018	0.189	Nov 2019	-		0.189	Continuing	Continuing	Continuing
Travel	WR	Various : Various	0.411	0.010	Oct 2017	0.010	Oct 2018	0.010	Oct 2019	-		0.010	Continuing	Continuing	Continuing
		Subtotal	0.411	0.195		0.195		0.199		-		0.199	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 1780 / *HARM Improvement*	

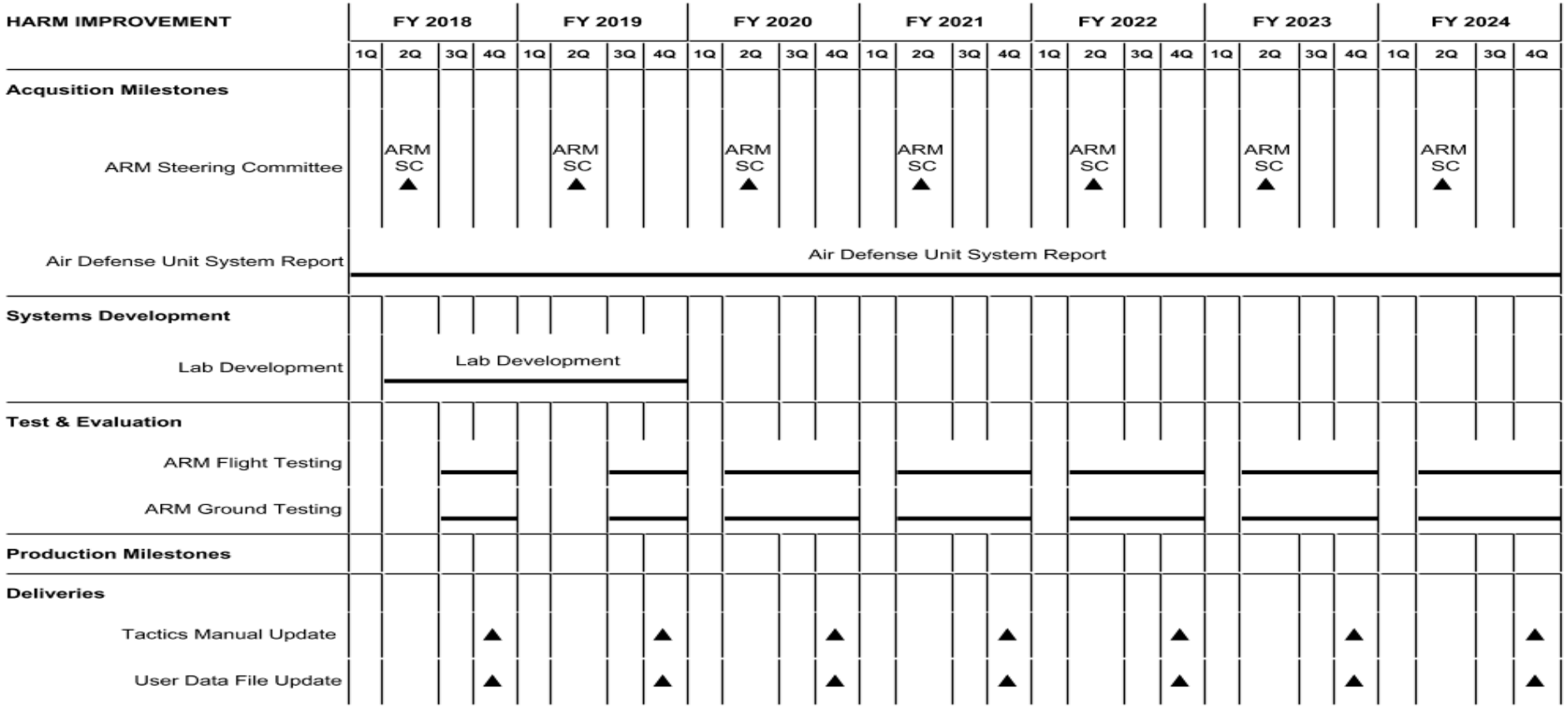
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks															
Contract Type for Travel is Travel Order (TO).															

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	51.724	6.396		6.256		7.105		-		7.105	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 1780 / *HARM Improvement*



2020DON - 0205601N - 1780

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 1780 / *HARM Improvement*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
HARM IMPROVEMENT				
Acqusition Milestones: ARM Steering Committee: FY 2018 ARM Steering Committee	2	2018	2	2018
Acqusition Milestones: ARM Steering Committee: FY 2019 ARM Steering Committee	2	2019	2	2019
Acqusition Milestones: ARM Steering Committee: FY 2020 ARM Steering Committee	2	2020	2	2020
Acqusition Milestones: ARM Steering Committee: FY 2021 ARM Steering Committee	2	2021	2	2021
Acqusition Milestones: ARM Steering Committee: FY 2022 ARM Steering Committee	2	2022	2	2022
Acqusition Milestones: ARM Steering Committee: FY 2023 ARM Steering Committee	2	2023	2	2023
Acqusition Milestones: ARM Steering Committee: FY 2024 ARM Steering Committee	2	2024	2	2024
Acqusition Milestones: Air Defense Unit System Report: Air Defense Unit System Report	1	2018	4	2024
Systems Development: Lab Development: Lab Development	2	2018	4	2019
Test & Evaluation: ARM Flight Testing: Flight Testing FY 2018 QTR 3-4	3	2018	4	2018
Test & Evaluation: ARM Flight Testing: Flight Testing FY 2019 QTR 3-4	3	2019	4	2019
Test & Evaluation: ARM Flight Testing: Flight Testing FY 2020 QTR 2-4	2	2020	4	2020
Test & Evaluation: ARM Flight Testing: Flight Testing FY 2021 QTR 2-4	2	2021	4	2021
Test & Evaluation: ARM Flight Testing: Flight Testing FY 2022 QTR 2-4	2	2022	4	2022
Test & Evaluation: ARM Flight Testing: Flight Testing FY 2023 QTR 2-4	2	2023	4	2023
Test & Evaluation: ARM Flight Testing: Flight Testing FY 2024 QTR 2-4	2	2024	4	2024
Test & Evaluation: ARM Ground Testing: Ground Testing FY 2018 QTR 3-4	3	2018	4	2018
Test & Evaluation: ARM Ground Testing: Ground Testing FY 2019 QTR 3-4	3	2019	4	2019
Test & Evaluation: ARM Ground Testing: Ground Testing FY 2020 QTR 2-4	2	2020	4	2020
Test & Evaluation: ARM Ground Testing: Ground Testing FY 2021 QTR 2-4	2	2021	4	2021
Test & Evaluation: ARM Ground Testing: Ground Testing FY 2022 QTR 2-4	2	2022	4	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 1780 / *HARM Improvement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Test & Evaluation: ARM Ground Testing: Ground Testing FY 2023 QTR 2-4	2	2023	4	2023
Test & Evaluation: ARM Ground Testing: Ground Testing FY 2024 QTR 2-4	2	2024	4	2024
Deliveries: Tactics Manual Update: Tactics Manual Update FY 2018	4	2018	4	2018
Deliveries: Tactics Manual Update: Tactics Manual Update FY 2019	4	2019	4	2019
Deliveries: Tactics Manual Update: Tactics Manual Update FY 2020	4	2020	4	2020
Deliveries: Tactics Manual Update: Tactics Manual Update FY 2021	4	2021	4	2021
Deliveries: Tactics Manual Update: Tactics Manual Update FY 2022	4	2022	4	2022
Deliveries: Tactics Manual Update: Tactics Manual Update FY 2023	4	2023	4	2023
Deliveries: Tactics Manual Update: Tactics Manual Update FY 2024	4	2024	4	2024
Deliveries: User Data File Update: User Data File Update FY 2018	4	2018	4	2018
Deliveries: User Data File Update: User Data File Update FY 2019	4	2019	4	2019
Deliveries: User Data File Update: User Data File Update FY 2020	4	2020	4	2020
Deliveries: User Data File Update: User Data File Update FY 2021	4	2021	4	2021
Deliveries: User Data File Update: User Data File Update FY 2022	4	2022	4	2022
Deliveries: User Data File Update: User Data File Update FY 2023	4	2023	4	2023
Deliveries: User Data File Update: User Data File Update FY 2024	4	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*				Project (Number/Name) 2185 / *AARGM*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2185: *AARGM*	721.810	14.798	15.266	11.677	-	11.677	11.192	4.787	4.886	4.985	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 368

A. Mission Description and Budget Item Justification

Advanced Anti-Radiation Guided Missile (AARGM) transitioned a Phase III Small Business Innovation Research (SBIR) program to develop and demonstrate a multi-mode guidance section on a High Speed Anti-Radiation Missile (HARM) airframe to System Development and Demonstration (SD&D) in FY 2003. The AARGM SD&D program was designed to integrate multi-mode guidance (passive Anti-Radiation Homing (ARH)/active Millimeter Wave (MMW) Radar/Global Positioning System (GPS)/ Inertial Navigation System) on the HARM Air-to-Ground Missile (AGM)-88. Planned AARGM weapon system capabilities include: active MMW terminal guidance, counter shutdown, expanded threat coverage, enhanced ARH, netted targeting real-time feed via Integrated Broadcast System (IBS) prior to missile launch, Weapon Impact Assessment (WIA) transmitted prior to detonation, GPS/point-to-point weapon navigation, enhanced navigational performance in denied environments and weapon employment with impact avoidance zone/missile impact zones.

The AARGM program includes 40 SD&D test articles with the follow on of 2,435 production modification kits. Milestone C was achieved 4Q FY 2008, followed by a combined FY 2008/FY 2009 Low Rate Initial Production (LRIP) contract award in 1Q FY 2009. Developmental testing was completed in 2009. Initial Operational Test and Evaluation (IOT&E) was completed in 3Q FY 2012. Full-Rate Production (FRP) decision was received 4 September 2012 with FRP contract award on 10 September 2012, and deliveries began in January 2014.

The AARGM Block 1 Upgrade program began in FY 2012 and consists of a software only upgrade to deferred Key Performance Parameter 3 and to correct IOT&E deficiencies in the AGM-88E All-Up-Round as well as the Common Munitions Built-in Test (BIT) Reprogramming Equipment (CMBRE).

Follow-on Operational Test and Evaluation/Integrated Test (FOT&E/IT) of the Block 1 Upgrade completed with Fleet Release approval in July 2017 and completion in January 2018.

In FY 2020 - FY 2024, the AARGM program plans to continue to develop and demonstrate the capability to engage and destroy non-traditional and Overseas Contingency Operations targets. These developments continue Future Naval Capability Science and Technology investments by the Office of Naval Research initiated in FY 2006. Over this same timeframe, the AARGM program will develop or enhance navigational capability in denied environments.

FY 2020 funding continues to support AARGM's advanced development and system capability upgrades. Additional funding will support the implementation of M Code, AARGM Derivative Program and upgrades to the radio frequency data processing to meet emerging requirements.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2185 / *AARGM*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Threat Data Library / System Updates	2.230	1.200	1.224	0.000	1.224
Articles:	-	-	-	-	-
FY 2019 Plans: AGM-88E continues effort to upgrade and prioritize Electronic Intelligence files. Continue test and assessment of threat systems that impact already fielded weapons and to develop threat data for new target sets. Plans also include development or enhancement of navigational capability, integration of modernized Anti-Radiation Homing processor, and human system interface improvements to mission planning.					
FY 2020 Base Plans: AGM-88E continues effort to upgrade and prioritize Electronic Intelligence files. Continue test and assessment of threat systems that impact already fielded weapons and to develop threat data for new target sets. Plans also include development or enhancement of navigational capability, integration of modernized Anti-Radiation Homing processor, and human system interface improvements to mission planning.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 to FY 2020 increase due to continuation of Threat Data Library / System Updates.					
Title: Follow-on Operational Test and Evaluation (FOT&E) and Correction of Deficiencies	0.475	0.484	0.494	0.000	0.494
Articles:	-	-	-	-	-
FY 2019 Plans: Continue to upgrade the system with test results to include developmental activity assessing software and hardware anomalies. Testing for those efforts in System Updates includes navigational T&E, processor performance evaluations, and includes verification and validation for correction of deficiencies from Block 0 and Block 1 testing.					
FY 2020 Base Plans: Continue to upgrade the system with test results to include developmental activity assessing software and hardware anomalies. Testing for those efforts in System Updates includes navigational T&E, processor performance evaluations, and includes verification and validation for E2 hardware changes and Block 1A testing.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2185 / *AARGM*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 to FY 2020 increase due to continued execution of AARGM FOT&E and Correction of Deficiencies efforts.					
Title: Advanced Development	12.093	13.582	9.959	0.000	9.959
Articles:	-	-	-	-	-
FY 2019 Plans: Enhance navigational capability to comply with requirement to implement M-Code to comply with U.S. Statute. Award the M Code Integration & Test contract. Funding supports upgrade of the radio frequency data processing to meet emerging requirements. Funding supports the transition of receiver technology upgrades in coordination with the Office of Naval Research (ONR) project ALPO. Funding supports testing, configuration control board review, test plan reviews, requirements analysis and weapons integration analysis. Funding supports upgrading AGM-88E capability against non-traditional and OCO targets. This includes weapon system developmental activities, range and laboratory support and analysis. In FY 2019, the AARGM program plans to develop and demonstrate the capability to engage and destroy non-traditional and Overseas Contingency Operations targets.					
FY 2020 Base Plans: Enhance navigational capability to comply with requirement to implement M-Code to comply with U.S. Statute. Continue M Code Integration & Testing and continued upgrade of the radio frequency data processing to meet emerging requirements by updating the Block 1A missile software to add Complex Emitters, AARGM Derivative Program (ADP), M-Code, and Reprogramming Capability. Funding supports the continued transition of receiver technology upgrades in coordination with the Office of Naval Research (ONR) project ALPO. Efforts specifically include testing, configuration control board reviews, test plan reviews, requirements analysis and weapons integration analysis. This project supports an upgraded AGM-88E capability against non-traditional and OCO targets. Effort in support of this requirement includes weapon system developmental activities, range and laboratory support and analysis. In FY 2020, the AARGM program plans to continue to develop and demonstrate the capability to engage and destroy non-traditional and Overseas Contingency Operations targets.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease of funding from FY 2019 to FY 2020 is due to the phasing of the M-Code Development and AARGM Derivative Program efforts.					
Accomplishments/Planned Programs Subtotals	14.798	15.266	11.677	0.000	11.677

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2185 / *AARGM*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN 2327: *HARM Mods*	183.368	179.885	183.740	-	183.740	188.073	175.142	178.658	0.000	0.000	1,920.301

Remarks

FY 2021 - FY 2024 Total Cost funding listed does not include the Advanced Anti-Radiation Guided Missile Extended Range funding.

D. Acquisition Strategy

The AARGM program started as a Phase I Small Business Innovative Research (SBIR), Advanced Technology Program, evolved into a Phase III SBIR program, and transitioned into a System Development and Demonstration (SD&D) Acquisition Category 1C program in June 2003. The AARGM SD&D met most U.S. Navy operational requirements. AARGM Advanced Technology Development and Quick Bolt Advanced Concept Technology Demonstration demonstrated possible future system enhancements. AARGM Block 1 fulfills the rest of the operational requirements. Block 1 Fleet Release was approved in 4Q FY 2017. ONR Future Naval Capability AARGM Derivative Program (ADP) Program to transition in FY 2019. Expand target set capability and add M-code in FY 2018 - FY 2024.

E. Performance Metrics

Block 1 Fleet Release complete 2Q FY 2018. ADP Transition FY 2019. M-Code capable FY 2021. ADP and Complex Emitter Capable FY 2022.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2185 / *AARGM*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	SS/CPFF	Northrop Grumman Corporation Innovation Systems : Northridge, CA	0.000	9.049	Dec 2017	0.000		0.000		-		0.000	0.000	9.049	-
Systems Engineering	WR	NAWCWD : China Lake, CA	83.472	2.055	Nov 2017	1.016	Nov 2018	1.036	Nov 2019	-		1.036	Continuing	Continuing	Continuing
M Code	SS/IDIQ	Northrop Grumman Corporation Innovation Systems : Northridge, CA	0.000	1.000	Mar 2018	0.900	Jun 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Software Development (Block 1A)	SS/IDIQ	Northrop Grumman Corporation Innovation Systems : Northridge, CA	0.000	1.026	Mar 2018	9.473	Dec 2018	6.780	Dec 2019	-		6.780	Continuing	Continuing	Continuing
Mission Planning	WR	Various : Various	0.833	0.100	Mar 2018	0.100	Mar 2019	0.100	Mar 2020	-		0.100	Continuing	Continuing	Continuing
Prior year Prod Dev no longer funded in the FYDP	Various	Various : Various	544.279	0.000		0.000		0.000		-		0.000	0.000	544.279	-
		Subtotal	628.584	13.230		11.489		7.916		-		7.916	Continuing	Continuing	N/A

Remarks

FY 2020 Product Development funding planned to continue to support Radio Frequency (RF) Processor firmware, RF Processor software, A2 Card firmware, the transition of the ONR Future Naval Capability Project ALPO into the program of record AARGM Derivative Program (ADP) and Missile Software (Block 1A) development efforts.

"Orbital ATK" Performing Activity renamed to "Northrop Grumman Corporation Innovation Systems."

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior year Support no longer funded in the FYDP	Various	Various : Various	7.147	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	7.147	0.000		0.000		0.000		-		0.000	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 2185 / *AARGM*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test & Evaluation	WR	NAWCWD : China Lake, CA	26.433	0.528	Nov 2017	0.429	Nov 2018	0.437	Nov 2019	-		0.437	Continuing	Continuing	Continuing
Operational and Integrated Test & Evaluation (IT&OT)	WR	NAWCWD : China Lake, CA	12.772	0.000		2.300	Jun 2019	0.100	Nov 2019	-		0.100	Continuing	Continuing	Continuing
Operational and Integrated Test & Evaluation (IT&OT)	SS/IDIQ	Northrop Grumman Corporation Innovation Systems : Northridge, CA	1.342	0.000		0.000		2.158	Dec 2019	-		2.158	Continuing	Continuing	Continuing
Prior year T&E no longer funded in the FYDP	Various	Various : Various	24.929	0.000		0.000		0.000		-		0.000	0.000	24.929	-
		Subtotal	65.476	0.528		2.729		2.695		-		2.695	Continuing	Continuing	N/A

Remarks

FY 2020 funding is for continued IT&OT to support testing required for M Code integration and Block 1A.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	Various	Various : Various	5.136	0.250	Feb 2018	0.250	Feb 2019	0.255	Feb 2020	-		0.255	Continuing	Continuing	Continuing
Travel	WR	NAVAIR HQ : Patuxent River, MD	1.778	0.015	Oct 2017	0.015	Oct 2018	0.015	Oct 2019	-		0.015	Continuing	Continuing	Continuing
Government Engineering Support	WR	NAWCAD : Patuxent River, MD	2.639	0.575	Nov 2017	0.583	Nov 2018	0.596	Nov 2019	-		0.596	Continuing	Continuing	Continuing
Program Management Support	Various	NRO : Washington, D.C.	0.800	0.200	Nov 2017	0.200	Nov 2018	0.200	Nov 2019	-		0.200	Continuing	Continuing	Continuing
Prior year Mgmt no longer funded in the FYDP	Various	Various : Various	10.250	0.000		0.000		0.000		-		0.000	0.000	10.250	-
		Subtotal	20.603	1.040		1.048		1.066		-		1.066	Continuing	Continuing	N/A

Remarks

Contract Type for Travel is TO.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 2185 / *AARGM*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	721.810	14.798		15.266		11.677		-		11.677	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2185 / *AARGM*

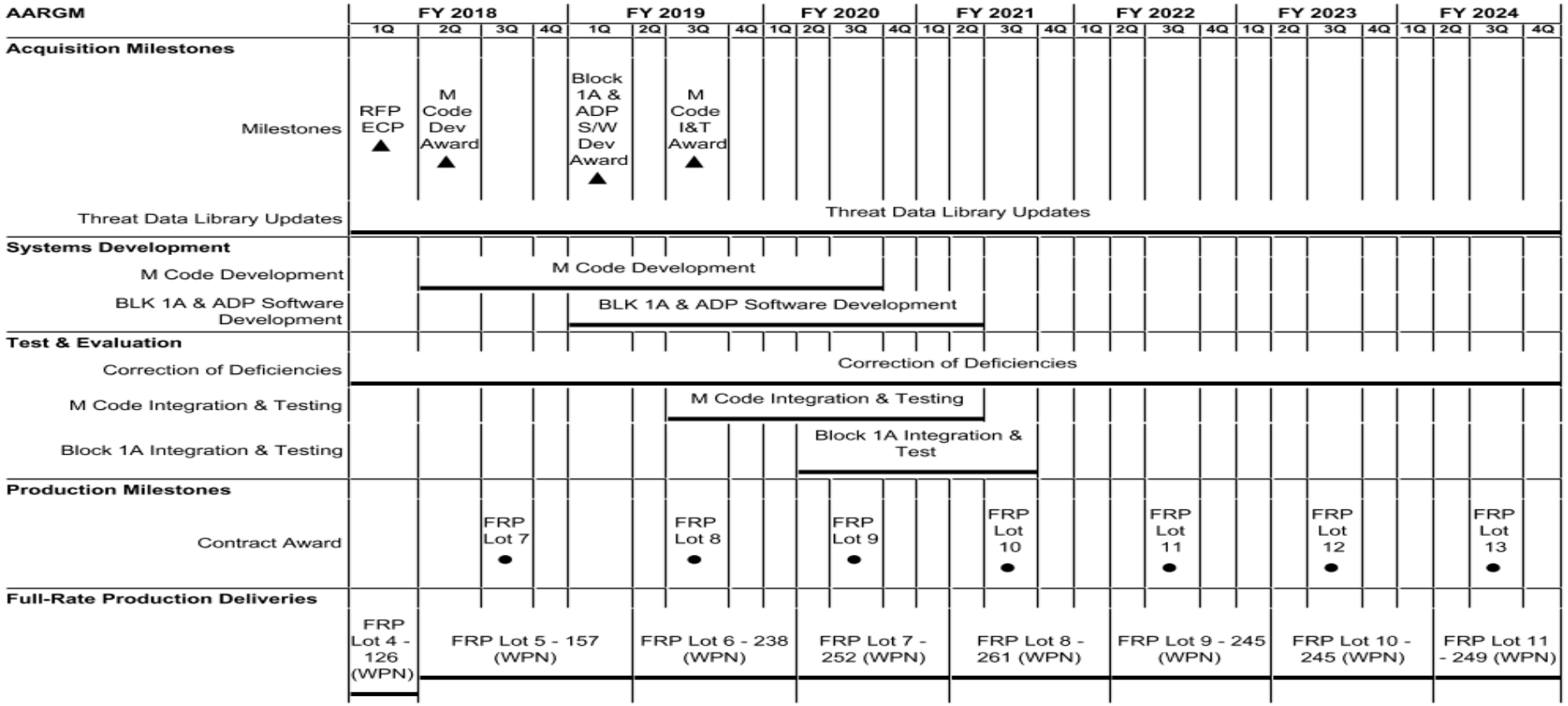


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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2185 / *AARGM*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
AARGM				
Acquisition Milestones: Milestones: Radio Frequency Processor Upgrade	1	2018	1	2018
Acquisition Milestones: Milestones: M Code Dev Award	2	2018	2	2018
Acquisition Milestones: Milestones: Block 1A & ADP S/W Dev Award	1	2019	1	2019
Acquisition Milestones: Milestones: M Code I&T Award	3	2019	3	2019
Acquisition Milestones: Threat Data Library Updates: Threat Data Library Updates	1	2018	4	2024
Systems Development: M Code Development: M Code Development	2	2018	3	2020
Systems Development: BLK 1A & ADP Software Development: BLK 1A & ADP Software Development	1	2019	2	2021
Test & Evaluation: Correction of Deficiencies: Correction of Deficiencies	1	2018	4	2024
Test & Evaluation: M Code Integration & Testing: M Code Integration & Testing	3	2019	2	2021
Test & Evaluation: Block 1A Integration & Testing: Block 1A Integration & Testing	2	2020	3	2021
Production Milestones: Contract Award: Full-Rate Production Lot 7	3	2018	3	2018
Production Milestones: Contract Award: Full-Rate Production Lot 8	3	2019	3	2019
Production Milestones: Contract Award: Full-Rate Production Lot 9	3	2020	3	2020
Production Milestones: Contract Award: Full-Rate Production Lot 10	3	2021	3	2021
Production Milestones: Contract Award: Full-Rate Production Lot 11	3	2022	3	2022
Production Milestones: Contract Award: Full-Rate Production Lot 12	3	2023	3	2023
Production Milestones: Contract Award: Full-Rate Production Lot 13	3	2024	3	2024
Full-Rate Production Deliveries: Full-Rate Production Deliveries - Lot 4 (WPN)	1	2018	1	2018
Full-Rate Production Deliveries: Full-Rate Production Deliveries - Lot 5 (WPN)	2	2018	1	2019
Full-Rate Production Deliveries: Full-Rate Production Deliveries - Lot 6 (WPN)	2	2019	1	2020
Full-Rate Production Deliveries: Full-Rate Production Deliveries - Lot 7 (WPN)	2	2020	1	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2185 / *AARGM*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Full-Rate Production Deliveries: Full-Rate Production Deliveries - Lot 8 (WPN)	2	2021	1	2022
Full-Rate Production Deliveries: Full-Rate Production Delieveries - Lot 9 (WPN)	2	2022	1	2023
Full-Rate Production Deliveries: Full-Rate Production Deliveries - Lot 10 (WPN)	2	2023	1	2024
Full-Rate Production Deliveries: Full-Rate Production Deliveries - Lot 11 (WPN)	2	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 2189 / *AARGM ER*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2189: *AARGM ER*	38.317	49.221	99.240	119.649	-	119.649	49.605	34.825	42.249	48.225	Continuing	Continuing
Quantity of RDT&E Articles		-	15	2	-	2	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air-to-Ground (AGM)-88 Extended Range (ER) Upgrade was a new start in FY 2016. The purpose of this effort is to develop hardware and software modifications to improve the Advanced Anti-Radiation Guided Missile (AARGM)'s operational capabilities, including extended range, survivability and effectiveness against complex, new, and emerging threats. This budget line item funds a new rocket motor design, system development and integration, test asset procurement, testing, and associated software updates for the AARGM-ER to ensure these capabilities perform in accordance with established requirements. FY 2020 activities include continuation of the Engineering & Manufacturing Development (EMD) phase, initiation of Developmental Test & Evaluation, and the commencement of test articles delivery. AARGM-ER retains the same guidance, sensor, and warhead capabilities of the AARGM.

The AARGM-ER program is part of the Navy's Integrated Fire Control (IFC) approach to address advanced threat capabilities in the Anti-Access/Area-Denial (A2/AD) environment. IFC solutions enable individual system capabilities to be leveraged across an effects chain, placing the full spectrum of tactical capability in the hands of the warfighter. IFC solutions that push engagement distances beyond the launch platform's radar horizon and allows the U.S. Navy to operate in, and control, contested battle space in littoral waters and A2/AD environments are increasingly critical as more scenarios require compressed and coordinated fire control timelines.

AARGM-ER is a capability-based acquisition program and has been structured to meet the CNO's urgency mandate to deliver warfighting capability as soon as possible.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: AARGM ER Development	49.221	99.240	119.649	0.000	119.649
Articles:	-	15	2	-	2
FY 2019 Plans: FY 2019 activities include completion of the Missile Section Integration contract and contract award for the Engineering & Manufacturing Development phase to include procurement of test articles. Execute Knowledge Point 2 and complete a Preliminary Design Review. Continue range safety analysis for telemetry section Flight Termination System development. Funding supports upgrading capability to process and target non-traditional and advanced signals. This includes weapon system developmental activities, range and laboratory support and analysis.					
FY 2020 Base Plans: FY 2020 activities include continuation of the Engineering and Manufacturing Development contract and commencement of aircraft integration. Execute Knowledge Point 3 and complete a Critical Design Review. Test & evaluation of software for the guidance section will continue in support of functional ground and flight testing.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2189 / *AARGM ER*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Preliminary Flight Rating Test events will assess rocket motor performance in advance of first free flight events in FY21. Jettison and safe separation flights will assess the weapons autopilot in various environments where the missile is separating from the host aircraft. Begin rocket motor qualification. Flight test planning for captive carriage of training missiles begins. Continuation of build of test articles for analysis and qualification. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of funding from FY 2019 to FY 2020 is due to the commencement of Developmental Test & Evaluation and the commencement of aircraft integration.					
Accomplishments/Planned Programs Subtotals	49.221	99.240	119.649	0.000	119.649

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN 2327: *HARM Mods*	0.000	0.000	0.000	-	0.000	30.000	30.662	31.275	214.125	1,432.469	1,738.531

Remarks

FY 2021 - FY 2024 and Total Cost funding listed does not include the AARGM Block 1 funding.

D. Acquisition Strategy

The AARGM Extended Range Program will provide hardware and software modifications to improve AARGM's operational capabilities, including extended range, survivability, and effectiveness against complex, new, and emerging threats. The program's objective requirement for Initial Operational Capability is FY 2023.

E. Performance Metrics

AARGM-ER activities to support a Knowledge Point 2 in FY 2019 and a Knowledge Point 3 in FY 2020. KP-2 is equivalent to a Milestone B approval. KP-3 is a Critical Design Review (CDR) type event.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 2189 / *AARGM ER*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Rocket Motor Risk Initiative	WR	NAWCWD : China Lake, CA	0.447	0.500	Nov 2017	0.000		0.000		-		0.000	0.000	0.947	-
Rocket Motor Risk Initiative	WR	NSWC : Indian Head, MD	0.500	0.500	Dec 2017	0.000		0.000		-		0.000	0.000	1.000	-
Front End Design Analysis	SS/CPFF	Northrop Grumman Corporation Innovation Systems : Northridge, CA	13.095	2.126	Oct 2017	0.000		0.000		-		0.000	0.000	15.221	15.221
Missile Section Integration	SS/CPFF	Northrop Grumman Corporation Innovation Systems : Northridge, CA	6.578	34.465	Jan 2018	15.165	Oct 2018	0.000		-		0.000	0.000	56.208	44.464
Engineering & Manufacturing Development	SS/CPIF	Northrop Grumman Corporation Innovation Systems : Northridge, CA	0.000	0.000		35.335	Feb 2019	77.240	Dec 2019	-		77.240	Continuing	Continuing	Continuing
Aircraft Integration	WR	NAWCWD : China Lake, CA	0.884	0.023	Jan 2018	6.000	Jan 2019	10.050	Nov 2019	-		10.050	Continuing	Continuing	Continuing
Aircraft Integration	TBD	Boeing : St. Louis, MO	0.000	0.000		1.000	May 2019	6.000	Nov 2019	-		6.000	0.000	7.000	-
Systems Engineering	WR	NAWCWD : China Lake, CA	8.077	5.356	Nov 2017	6.146	Nov 2018	6.269	Nov 2019	-		6.269	Continuing	Continuing	Continuing
Systems Engineering	WR	NAWCAD : Patuxent River, MD	1.466	1.900	Nov 2017	3.379	Nov 2018	3.447	Nov 2019	-		3.447	Continuing	Continuing	Continuing
Telemetry Section	WR	NAWCWD : China Lake, CA	0.200	0.204	Nov 2017	2.184	Nov 2018	2.184	Nov 2019	-		2.184	Continuing	Continuing	Continuing
		Subtotal	31.247	45.074		69.209		105.190		-		105.190	Continuing	Continuing	N/A

Remarks

FY 2020 activities include execution of the Engineering & Manufacturing Development phase.

"Orbital ATK" Performing Activity renamed to "Northrop Grumman Corporation Innovation Systems.

Engineering & Manufacturing Development Contract will ramp up to support aircraft integration testing, rocket motor preliminary flight rating qualification, and weapon software development.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 2189 / *AARGM ER*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Aircraft Integration (NAWCWD) will ramp up to support the F/A-18 H18 software build.

Aircraft Integration (Boeing) will ramp up with aircraft interface software development and testing.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Studies & Analysis	Various	Various : Various	3.606	2.328	Nov 2017	0.500	Mar 2019	0.000		-		0.000	0.000	6.434	-
		Subtotal	3.606	2.328		0.500		0.000		-		0.000	0.000	6.434	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCAD : Patuxent River, MD	0.000	0.000		1.550	Nov 2018	5.230	Apr 2020	-		5.230	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	NAWCWD : China Lake, CA	0.000	0.000		0.000		3.217	Apr 2020	-		3.217	0.000	3.217	-
ER Test Assets	TBD	Northrop Grumman Corporation Innovation Systems : Northridge, CA	0.000	0.000		25.500	Feb 2019	3.468	Nov 2019	-		3.468	0.000	28.968	25.500
T&E Support	WR	COTF : Norfolk, VA	0.050	0.000		0.200	Nov 2018	0.204	Nov 2019	-		0.204	0.000	0.454	-
Operational and Integrated T&E	WR	Various : Various	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	0.050	0.000		27.250		12.119		-		12.119	Continuing	Continuing	N/A

Remarks

Developmental Test & Evaluation (NAWCAD) will increase to obtain a flight clearance, perform airborne store separation testing, and interoperability testing with the Next Generation Jammer Mid-Band (NGJ-MB) system on the EA-18G Growler platform.

Developmental Test & Evaluation (NAWCWD) will increase due to missile aircraft interface and arena testing for the warhead.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205601N / *Harm Improvement*	Project (Number/Name) 2189 / *AARGM ER*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
15 Test articles were procured in FY 2019 and 2 test articles will be procured in FY2020. All Up Round test assets support testing on the F/A-18 E/F and EA-18G including captive carry and missile free flight test events. Testing is required to address environmental and aeromechanical design considerations for the missile and aircraft integration. Testing is also required to evaluate missile guidance and control characteristics and validate free flight performance.															

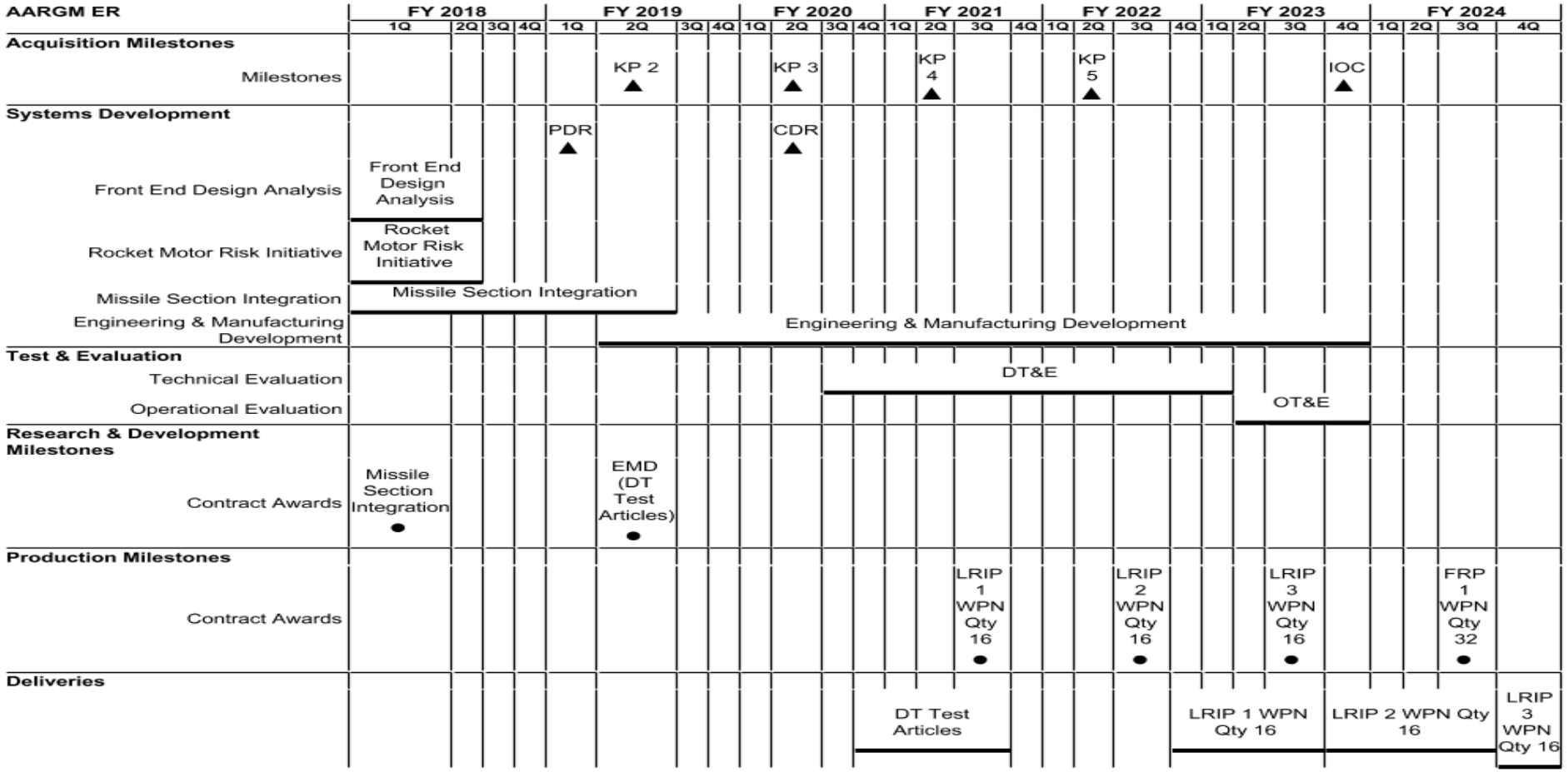
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	Various	Various : Various	1.663	1.139	Nov 2017	1.161	Nov 2018	1.184	Nov 2019	-		1.184	Continuing	Continuing	Continuing
Program Management Support	WR	NAWCAD : Patuxent River, MD	1.697	0.600	Nov 2017	1.025	Nov 2018	1.046	Nov 2019	-		1.046	Continuing	Continuing	Continuing
Government Engineering & Information Technology Support	WR	NSWC : Dahlgren, VA	0.037	0.030	Oct 2017	0.035	Oct 2018	0.040	Oct 2019	-		0.040	Continuing	Continuing	Continuing
Travel	WR	NAVAIR HQ : Patuxent River, MD	0.017	0.050	Nov 2017	0.060	Nov 2018	0.070	Nov 2019	-		0.070	Continuing	Continuing	Continuing
		Subtotal	3.414	1.819		2.281		2.340		-		2.340	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	38.317	49.221		99.240		119.649		-		119.649	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2189 / *AARGM ER*



2020PB - 0205601N - 2189

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2189 / *AARGM ER*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
AARGM ER				
Acquisition Milestones: Milestones: Knowledge Point 2	2	2019	2	2019
Acquisition Milestones: Milestones: Knowledge Point 3	2	2020	2	2020
Acquisition Milestones: Milestones: Knowledge Point 4	2	2021	2	2021
Acquisition Milestones: Milestones: Knowledge Point 5	2	2022	2	2022
Acquisition Milestones: Milestones: IOC	4	2023	4	2023
Systems Development: Preliminary Design Review (PDR)	1	2019	1	2019
Systems Development: Critical Design Review (CDR)	2	2020	2	2020
Systems Development: Front End Design Analysis: Front End Design Analysis	1	2018	2	2018
Systems Development: Rocket Motor Risk Initiative: Rocket Motor Risk Initiative	1	2018	2	2018
Systems Development: Missile Section Integration: Missile Section Integration	1	2018	2	2019
Systems Development: Engineering & Manufacturing Development: Engineering & Manufacturing Development	2	2019	4	2023
Test & Evaluation: Technical Evaluation: Developmental Test & Evaluation	3	2020	1	2023
Test & Evaluation: Operational Evaluation: Operational Test & Evaluation	2	2023	4	2023
Research & Development Milestones: Contract Awards: Missile Section Integration	1	2018	1	2018
Research & Development Milestones: Contract Awards: Engineering & Manufacturing Development (DT Test Articles)	2	2019	2	2019
Production Milestones: Contract Awards: LRIP 1 WPN Qty 16	3	2021	3	2021
Production Milestones: Contract Awards: LRIP 2 WPN Qty 16	3	2022	3	2022
Production Milestones: Contract Awards: LRIP 3 WPN Qty 16	3	2023	3	2023
Production Milestones: Contract Awards: FRP 1 WPN Qty 32	3	2024	3	2024
Deliveries: DT Test Articles	4	2020	3	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205601N / *Harm Improvement*	**Project (Number/Name)** 2189 / *AARGM ER*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Deliveries: LRIP 1 WPN Qty 16	4	2022	3	2023
Deliveries: LRIP 2 WPN Qty 16	4	2023	3	2024
Deliveries: LRIP 3 WPN Qty 16	4	2024	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	1,189.059	75.523	88.979	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1,353.561
2126: *ATDLS Integration*	796.366	19.612	31.295	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	847.273
3020: *MIDS/JTRS*	306.593	38.876	43.798	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	389.267
3341: *Network Tactical Common Data Link*	86.100	17.035	13.886	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	117.021
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 554												

Note

Funding for the following projects has been realigned out of PE 0205604N into PE 0604280N as part of Program Element Consolidation starting in FY20: Project 3020 (MIDS/JTRS), Project 2126 (ATDLS Integration) and Project 3341 (Network Tactical Common Data Link).

A. Mission Description and Budget Item Justification

Tactical Data Link (TDL) systems includes the Advanced Tactical Data Link Systems (ATDLS) integration programs, specifically Link 16 Network, Command and Control Processor (C2P) and Link Monitoring and Management Tool (LMMT); and Network Tactical Common Data Link (NTCDL) Program which provides the ability to transmit/ receive real-time intelligence, surveillance, and reconnaissance (ISR) data simultaneously from multiple sources (surface, air, sub-surface, man-portable), and exchange command and control information (voice, data, imagery, and full motion video (FMV)) across dissimilar joint, service, coalition, and civil networks. The program element also develops and tests tactical data link capability to distribute other data types to new and existing platforms.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under operational systems development because it encompasses engineering and manufacturing development for upgrade of existing operational systems.

Link 16 Network Program provides high power shipboard and shore integrated Link 16 capability through the fielding of Joint Tactical Information Distribution System (JTIDS), Multifunctional Information Distribution System (MIDS) on Ships (MOS) and MOS Modernization (MOS Mod) including transmit and receive antennas and High Power Amplifiers (HPA). JTIDS, MOS and MOS Mod utilizes the JTIDS, MIDS Low Volume Terminal (LVT), and MIDS Joint Tactical Radio System (JTRS) terminals respectively, integrates the HPA and interfaces to the shipboard antenna and Command and Control Processor (C2P). MIDS-LVT and MIDS JTRS terminals are developed by the MIDS Program Office. JTIDS terminal is no longer in production, but is undergoing product improvement to maintain interoperability and security with MIDS-LVT and MIDS JTRS. As part of the product improvement all shipboard Link 16 terminals are required to have dynamic network management (DNM), crypto modernization (CM) and frequency remapping (FR). MIDS Program Office is developing additional improvements to the MIDS-LVT and MIDS JTRS terminals. The MIDS-LVT will have Link 16 Enhanced Throughput (ET) and the MIDS JTRS will have the added capability of four net concurrent multi-netting (CMN) with current contention receive (CCR) and tactical targeting networking technology (TTNT).

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*

The Multifunctional Information Distribution System (MIDS) program office is the Lead Service for Department of Defense (DOD) Link 16 capability and consists of two (2) product lines, MIDS Low Volume Terminal (LVT) (legacy hardware defined radio) and MIDS Joint Tactical Radio System (JTRS) (software defined radio). MIDS-LVT effort is a cooperative development program between France, Germany, Italy, Spain, and the United States with United States joint service participation (Navy, Army, Air Force), and has provided over 11,000 terminals to 48 Nations providing interoperability with North Atlantic Treaty Organization (NATO) and coalition partners. The Department of Defense (DoD) established the program to design, develop, and deliver low volume, lightweight tactical information system terminals for U.S. and allied fighter aircraft, bombers, helicopters, ships, and ground sites. MIDS-LVT significantly increases force effectiveness and minimizes hostile actions and friend-on-friend engagements. The current development program for LVT is the Block Upgrade 2 (BU2) effort designed to meet the Cryptographic Modernization (CM) and Frequency Remapping (FR) mandates required for all US and international users which occurs inside the FYDP. MIDS-LVT BU2 was executed as an ECP and provides the critical upgrades to the MIDS-LVT Terminal to enable U.S., Coalition and International partners' ability to meet the National Security Agency (NSA) mandated timelines for CM and the National Telecommunications and Information Agency (NTIA) and Federal Aviation Agency (FAA) mandated timelines for FR.

MIDS JTRS, designed as a pre-planned product improvement (P3I) and executed as an engineering change proposal (ECP) to the production MIDS-LVT configuration, completed qualification in the first quarter of fiscal year 2010. It facilitated the JTRS incremental approach for fielding advanced JTRS transformational networking capability and transformed the MIDS-LVT into a 4-channel, Software Communications Architecture (SCA) compliant, Joint Tactical Radio. A form-fit-function replacement to MIDS-LVT, MIDS JTRS also adds three programmable 2 Megahertz (MHz) to 2 Gigahertz (GHz) channels capable of hosting the JTRS legacy and networking waveforms. In addition to the Link 16, Tactical Air Navigation, and voice functionality found in MIDS-LVT, MIDS JTRS has four channels and adds capabilities such as Link 16 Enhanced Throughput, Link 16 Frequency Re-mapping, software programmability, cryptographic modernization, and Four Net concurrent multi-netting with concurrent contention receive (CMN-4). MIDS Modernization Increment 1 will be fielded with all MIDS JTRS CMN4 terminals. The upgrade of the Link 16 transceiver will provide more capacity to host software and firmware and increase multi-path use.

The TTNT waveform is the next waveform to be added to the MIDS JTRS terminal. TTNT is a low latency, high throughput waveform that has the capability to support data exchange between fast-moving tactical aircraft, weapons, and unmanned aircraft, in addition to air, land, and sea-based command and control nodes, in a variety of air-to-air and air-to-ground missions including time sensitive targeting, air warfare, close air support, non-traditional ISR, and anti-surface warfare. TTNT capability integration into the MIDS JTRS directly supports Naval Integrated Fire Control (NIFC) capability requirements. These capabilities provide Joint Airborne Network-Tactical Edge functionality to run advanced mission applications in a cross-platform/cross-domain tactical network enterprise, the TTNT capability will be in addition to the CMN-4 terminal providing Link 16 capability, and the ability to simultaneously participate in four Link 16 Nets.

MIDS JTRS Tactical Targeting Network Technology (TTNT), is a block upgrade to the MIDS JTRS CMN-4 Terminal provides an Internet Protocol-based networking capability on tactical aircraft. TTNT is a low latency, high throughput waveform that has the capability to support data exchange between fast-moving tactical aircraft, weapons, and unmanned aircraft, in addition to air, land, and sea-based command and control nodes, in a variety of air-to-air and air-to-ground missions including time sensitive targeting, air warfare, close air support, non-traditional ISR, and anti-surface warfare. TTNT capability integration into the MIDS JTRS directly supports Naval Integrated Fire Control (NIFC) capability requirements. These capabilities provide Joint Airborne Network-Tactical Edge functionality to run advanced mission applications in a cross-platform/cross-domain tactical network enterprise.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*

Network Tactical Common Data Link (NTCDL) provides the ability to transmit/receive real-time intelligence, surveillance, and reconnaissance (ISR) data simultaneously from multiple sources (air, surface, sub-surface, and man-portable) and exchange command and control information (voice, data, imagery, and full-motion video) across dissimilar joint, service, coalition, and civil networks. NTCDL provides warfighters the capability to support multiple, simultaneous, networked operations with in-service Common Data Link (CDL) equipped aircraft (e.g., F/A-35, P-3, and MH- 60R) in addition to next-generation manned and unmanned platforms (e.g., P-8 Poseidon, Triton, MQ-25 (Stingray), small tactical unmanned aircraft systems (STUAS), and Fire Scout). NTCDL benefits the Fleet by providing a horizon extension for line-of-sight systems for use in time-critical strike missions.

Network Tactical Common Data Link (NTCDL) High Capacity Backbone (HCB) efforts support Joint Aerial Layer Network-Maritime (JALN-M) System of Systems development, integration, and testing. JALN-M is the Navy implementation of the JALN architecture which provides assured communications in an Anti-Access/Area Denial (A2/AD) environment. With disruption or loss of Space tier communications, JALN-M establishes and/or restores connectivity with the HCB tier, the Distribution Access Range Extension (DARE) tier, and the Transition tier. JALN-M is a robust, assured communications capability providing joint connectivity via the HCB and Navy platform connectivity via a pseudo satellite DARE capability. Flight test demonstration completed in FY18.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	89.852	104.696	101.709	-	101.709
Current President's Budget	75.523	88.979	0.000	-	0.000
Total Adjustments	-14.329	-15.717	-101.709	-	-101.709
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-15.717			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.994	0.000			
• SBIR/STTR Transfer	-2.335	0.000			
• Program Adjustments	0.000	0.000	-11.122	-	-11.122
• Rate/Misc Adjustments	0.000	0.000	-90.587	-	-90.587
• Congressional Directed Reductions Adjustments	-10.000	-	-	-	-

Change Summary Explanation

ATDLS Integration (2126):
Funding was realigned to the new PE (0604280N/2126 ATDLS Integration) starting in FY20. The changes are listed in the new PE.

MIDS (3020):
Funding was realigned to the new PE (0604280N/3020 MIDS/JTRS) starting in FY20. The changes are listed in the new PE.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205604N *I Tactical Data Links*

NTCDL (3341):
Funding was realigned to the new PE (0604280N/3341 Network Tactical Common Data Link) starting in FY20. The changes are listed in the new PE.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*				Project (Number/Name) 2126 / *ATDLS Integration*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2126: *ATDLS Integration*	796.366	19.612	31.295	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	847.273
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Funding has been realigned out of PE 0205604N Project 2126, into PE 0604280N as part of RDTEN PE Consolidation starting in FY20.

A. Mission Description and Budget Item Justification

This project develops and improves the Navy's Tactical Data Link (TDL) systems. It includes the Advanced Tactical Data Link Systems (ATDLS) Integration Programs, specifically Link 16 Network, Command and Control Processor (C2P) and Link Monitoring and Management Tool (LMMT).

ATDLS Integration Program develops new and improved capabilities for Navy TDL users. The ATDLS Integration Programs perform technical analyses and engineering efforts associated with implementation of new technology to enable rapid introduction of new products and technology, prevent obsolescence, and end of support issues. The programs insert new technology enhancements via incremental software & hardware upgrades and deliver as annual build release. The Navy Link 16 Network Increment II consists of Dynamic Network Management (DNM), Cryptographic Modernization (CM) and Frequency Remapping (FR). C2P Technology Refresh (TR) and C2P Interoperability will modernize legacy C2P processing components to address C2P component obsolescence and fleet interoperability issues. C2P is a critical component in the Aegis Ballistic Missile Defense (BMD) architecture. C2P Modernization is a service life extension program required to sustain C2P support of Naval Integrated Air and Missile Defense (IAMD) and BMD capabilities. Link 22 development and integration into the C2P allows for standard data link communication with Coalition forces. LMMT will upgrade commercial off-the-shelf hardware and modernize software operating systems. LMMT will improve TDL performance monitoring and management in support of the Integrated Air & Missile Defense (IAMD) and Ballistic Missile Defense (BMD) missions.

Link 16 Network Increment II: (1) Develop and implement CM and FR mandates as a product improvement into Link 16 terminals and integration into shore sites, ship (NGC2P, Next Generation Command and Control Processor), and current Navy Joint Tactical Information Distribution System (JTIDS) airborne platforms; (2) Developmental Testing (DT) / Operational Testing (OT) of Navy platform CM/FR modifications; (3) provide product improvement for continued production capability Multifunctional Information Distribution System (MIDS) on Ship (MOS) Modernization (MOS Mod) and extensibility to new Tactical Data Link capabilities of shipboard Link 16 terminals, (4) qualification of replacement shipboard Link 16 antenna to replace end of life existing antenna. JTIDS, MOS CM/FR, and MOS Mod efforts are in support of NSA and Joint Chiefs of Staff mandates for the modernization of the cryptographic algorithm used in Link 16 terminals and the Department of Defense and the Department of Transportation Memorandum of Agreement for the implementation of a capability to remap any 14 of the existing 51 frequencies in order to remain operable within the United States and its possessions. All Link 16 terminals are required to have this capability to support Link 16 Interoperability.

Command and Control Processor (C2P) Technology Refresh (TR) funds a product improvement effort to the legacy C2P hardware components and allows legacy C2P software to execute on modern processors, thereby extending its effective service life. Product improvement efforts will include C2P software development, hardware integration, update of the C2P development environment to promote sustainability and testing to include follow-on test and evaluation (FOT&E) of the C2P TR baseline. Software development contractors will transform C2P legacy software code with modern supportable software code. "C2P, Phase 3", Increment 2 is planned to include Link 22, which is a modernized replacement for Link 11, providing beyond line of sight (BloS) tactical data communication system utilizing fixed frequency or frequency

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 2126 / *ATDLS Integration*

hopping techniques in the high frequency (HF) (3-30 Megahertz (MHz)) and/or the ultra high frequency (UHF) (225-400 MHz) bands. C2P Modernization is required to address Cybersecurity challenges, Operational Availability (Ao) challenges and sustainment issues associated with the current C2P system configurations. C2P Modernization funds the transition of the C2P's legacy CMS-2Y software code (old Navy unique computer programming language from the 1980s) to a modern software language. Transition to a modern software language is required to sustain the system software and to address growing cybersecurity and Ao challenges and to enable more affordable transition to new hardware processing components as a result of commercial off the shelf processor obsolescence.

Link Monitoring and Management Tool (LMMT) is a system delivered on commercial off-the-shelf hardware providing gateway functions for multiple Tactical Data Link (TDL) interface, routing and display of TDL data to include Link 16 and Joint Range Extension (JRE). LMMT is also capable of performing TDL network planning, monitoring, management, data forwarding between the TDLs and providing tactical data to the Global Command and Control System (GCCS) for establishing the common operational picture. LMMT requirements will be incrementally developed and delivered in capability drops via the Joint Capabilities Integration Development System (JCIDS) IT Box approach.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Link 16 Network Increment II - Cryptographic Modernization (CM) / Frequency Remapping (FR)	9.083	10.937	0.000	0.000	0.000
Articles:	1	10	-	-	-
FY 2019 Plans: Conduct government testing and correct identified deficiencies in JTIDS CM/FR LRIP units including shipboard integration. Initiate JTIDS CM/FR shipboard integrated testing including operational test. Continue preparations for JTIDS CM/FR Fielding Decision Review (FDR). Complete testing of the integration of JTIDS CM/FR with the E-2C. Continue MOS CM/FR integration testing and deficiency testing of MOS unit using MIDS LVT CM/FR updated terminals and HPA switch. Correct identified deficiencies in MOS CM/FR and MIDS LVT CM/FR terminal. Initiate MOS CM/FR integrated shipboard testing including operational test. Continue vendor testing of MOS Mod EMD units. Continue government testing and conduct at sea integrated and operational testing of MOS Mod. Correct identified deficiencies in MOS Mod and MIDS JTRS terminals. Continue preparations for MOS Mod FDR fielding decision review. Continue to integrate and test MIDS JTRS CMN terminal into MOS Modernization terminal. Identify MIDS JTRS CMN terminal deficiencies to be corrected by MIDS Program Office Continue Link 16 Network integration logistics support. Conduct Fielding Decision for Link 16 Antenna.					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 2126 / *ATDLS Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY20 funding has been realigned to PE 0604280N Project 2126 as part of PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0604280N Project 2126.					
Title: Command and Control Processor (C2P) ***Articles:*** ***FY 2019 Plans:*** Continue Link 22 development. Initiate and complete Link 22 IV&V testing. Continue C2P Modernization systems engineering and initiate software design activities. Commence C2P software Modernization Design and Development and document the Functional and Allocated baselines. Document and approve C2P Modernization development efforts through the conduct and completion of the System Requirement Review (SRR), Software Specification Review (SSR) and prepare for the Preliminary Design Review (PDR) and Critical Design Review (CDR). ***FY 2020 Base Plans:*** FY20 funding has been realigned to PE 0604280N Project 2126 as part of PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0604280N Project 2126.	8.696 -	18.707 -	0.000 -	0.000 -	0.000 -
Title: Link Monitoring and Management Tool (LMMT) ***Articles:*** ***FY 2019 Plans:*** Complete CD2 Fielding Technical Review (FTR) and the Fielding Decision Review (FDR). Prepare for Build Technical review (BTR) and then Build Decision (BD) for CD 3.	1.833 -	1.651 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 2126 / *ATDLS Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete CD 2 maintenance release and to conduct IVV. ***FY 2020 Base Plans:*** FY20 funding has been realigned to PE 0604280N Project 2126 as part of the PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0604280N Project 2126.					
Accomplishments/Planned Programs Subtotals	19.612	31.295	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2614: *Adv Tact Data Link Sys (ATDLS)*	34.873	30.085	52.753	-	52.753	66.952	82.338	57.660	61.728	Continuing	Continuing
• RDTEN/0604280N/2126: *Adv Tact Data Link Sys (ATDLS)*	0.000	0.000	18.201	-	18.201	22.862	21.206	22.611	23.063	Continuing	Continuing

Remarks

D. Acquisition Strategy

The JTIDS Crypto Modernization (CM)/Frequency Remapping (FR) development and low rate initial production (LRIP) contract was awarded to Data Link Solutions (DLS). The associated production contract for JTIDS CM/FR will be competitively awarded to support procurement after decision review. Multifunctional Information Distribution System (MIDS) on Ship (MOS) CM/FR will be accomplished through integration of the MIDS LVT Block Upgrade 2 (BU) into the existing MOS cabinet and development of a High-Power Amplifier (HPA) bypass switch. HPA bypass switch development was conducted by SSC Pacific. Production of HPA Switch will be performed by SSC PAC for existing MOS systems. To address the WIN 10 implementation for the MOS system, a new MOS Terminal Controller hardware and software has been developed and will be produced on the MOS Lot 4 contract. MOS MOD contract will provide three engineering manufacturing development (EMD) units for developmental and operational testing. The MOS MOD contract will also provide full rate production units. A second MOS Mod contract for production will be competitively awarded to extend the production period and increase capacity.

The C2P Technology Refresh (TR) and Link 22 development contract was awarded to Northrop Grumman. The Data Terminal Set (DTS) contract to support the Link 11/ Link 22 functions of the C2P system was awarded in August 2016. An existing IDIQ MAC contract will be used to procure initial TR units with a new ATDLS production contract planned for future procurements in FY 19 and beyond.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 2126 / *ATDLS Integration*

The Link Monitoring and Management Tool (LMMT) capability will replace previously-fielded Air Defense Systems Integrator (ADSI) systems. LMMT will leverage existing government-off-the-shelf (GOTS) software and commercial-off-the-shelf (COTS) hardware. LMMT capabilities are implemented primarily in software and will be developed in capability drops (CDs). Existing GOTS software will be updated to incorporate network performance monitoring and management capabilities by Space and Naval Warfare (SPAWAR) System Center (SSC).

E. Performance Metrics

Link 16 Network Dynamic Network Management (DNM): Successfully achieve initial operational capability. Successfully conduct full deployment decision review. Successfully complete operation test readiness review (OTRR). Successfully complete developmental test / operational test.

Link 16 Network Cryptographic Modernization: Successful implementation of updated cryptographic algorithm as specified by National Security Agency (NSA) certification in Joint Tactical Information Distribution System (JTIDS), Multifunctional Information Distribution System (MIDS) on Ship (MOS), and MOS Modernization (MOS Mod) Link 16 terminals.

Link 16 Network Frequency Remapping: Successful implementation of a frequency remapping capability as specified in Department of Defense/Department of Transportation Memorandum of Agreement regarding the 960-1215 MHz frequency band of 31 Dec 02 in Joint Tactical Information Distribution System (JTIDS), Multifunctional Information Distribution System (MIDS) on Ship (MOS) and MOS Modernization (MOS Mod) Link 16 Terminals.

Link 16 Antenna: Meet existing antenna performance specifications.

Link 16 Network Production Capability: Production shipboard Link 16 terminals available to meet new construction shipboard requirements.

Command and Control Processor (C2P): Successfully achieve C2P Technology Refresh fielding and thereby maintain operational availability.

Link 22: Successfully achieve Link 22 implementation fielding, meeting operational requirement.

LMMT: Successfully meet operational requirements and achieve fielding decision reviews (FDR) for Capability Drops 1, 2 and 3.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*	Project (Number/Name) 2126 / *ATDLS Integration*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATDLS Product Development and Integration	Various	Various : Various	436.906	0.000		0.000		0.000		-		0.000	0.000	436.906	387.088
Link 16 Network Development (JTIDS)	C/CPIF	DLS (BAE/ Rockwell) : Wayne, NJ	61.010	0.000		2.028	Oct 2018	0.000		-		0.000	0.000	63.038	Continuing
Link 16 Network E-2C Integration	WR	PMA 231 : Pax River, MD	11.284	2.154	Oct 2017	1.043	Oct 2018	0.000		-		0.000	0.000	14.481	Continuing
Link 16 Network Development (MOS MOD)	C/FPIF	DLS (BAE/ Rockwell) : Wayne, NJ	16.929	1.036	Oct 2017	1.630	Oct 2018	0.000		-		0.000	0.000	19.595	Continuing
Link 16 Network Integrated Logistics Support	C/CPFF	SeaPort-E : San Diego, CA	2.875	0.087	Oct 2017	0.023	Oct 2018	0.000		-		0.000	0.000	2.985	Continuing
Link 16 Network Technical Design Agents	C/CPFF	SeaPort-E : San Diego, CA	6.294	0.832	Oct 2017	0.734	Oct 2018	0.000		-		0.000	0.000	7.860	Continuing
Link 16 Network Systems Engineering	WR	SPAWARSYSCEN PAC : San Diego, CA	54.866	1.301	Oct 2017	1.270	Oct 2018	0.000		-		0.000	0.000	57.437	Continuing
C2P Development (Link 22)	C/IDIQ	Northrop Grumman : San Diego, CA	5.108	1.811	Nov 2017	0.000		0.000		-		0.000	0.000	6.919	Continuing
C2P Systems Engineering	WR	SPAWARSYSCEN PAC : San Diego, CA	22.038	0.000	Oct 2017	2.927	Oct 2018	0.000		-		0.000	0.000	24.965	Continuing
C2P IV&V	WR	SPAWARSYSCEN PAC : San Diego, CA	12.719	2.534	Oct 2017	3.288	Oct 2018	0.000		-		0.000	0.000	18.541	Continuing
C2P Development & Integration	WR	SPAWARSYSCEN PAC : San Diego, CA	15.900	1.069	Oct 2017	8.645	Oct 2018	0.000		-		0.000	0.000	25.614	Continuing
LMMT Development	WR	SPAWARSYSCEN PAC : San Diego, CA	9.206	0.000		0.000		0.000		-		0.000	0.000	9.206	Continuing
LMMT Systems Engineering	WR	SPAWARSYSCEN PAC : San Diego, CA	4.797	0.543	Oct 2017	1.237	Oct 2018	0.000		-		0.000	0.000	6.577	Continuing
LMMT IV&V	WR	SPAWARSYSCEN PAC : San Diego, CA	1.779	0.259	Oct 2017	0.000		0.000		-		0.000	0.000	2.038	-
		Subtotal	661.711	11.626		22.825		0.000		-		0.000	0.000	696.162	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*	Project (Number/Name) 2126 / *ATDLS Integration*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks															
FY20 cost data is provided under PE 0604280N Project 2126															

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATDLS Test and Evaluation	Various	Various : Various	65.171	0.000		0.000		0.000		-		0.000	0.000	65.171	65.171
Link 16 Network T&E	WR	SPAWARSYSCEN PAC : San Diego, CA	12.439	3.512	Dec 2017	3.826	Dec 2018	0.000		-		0.000	0.000	19.777	Continuing
C2P T&E	WR	SPAWARSYSCEN PAC : San Diego, CA	2.251	1.846	Nov 2017	2.251	Oct 2018	0.000		-		0.000	0.000	6.348	Continuing
LMMT T&E	WR	SPAWARSYSCEN PAC : San Diego, CA	3.200	0.515	Oct 2017	0.000		0.000		-		0.000	0.000	3.715	Continuing
		Subtotal	83.061	5.873		6.077		0.000		-		0.000	0.000	95.011	N/A

Remarks

FY20 cost data is provided under PE 0604280N Project 2126

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATDLS System Engineering Support	Various	Various : Various	35.988	0.000		0.000		0.000		-		0.000	0.000	35.988	35.988
Link 16 Network Program Management Support	C/CPFF	SeaPort-E : San Diego, CA	5.437	0.161	Oct 2017	0.385	Oct 2018	0.000		-		0.000	0.000	5.983	Continuing
C2P Program Management Support	C/CPFF	SeaPort-E : San Diego, CA	7.472	0.716	Nov 2017	0.777	Nov 2018	0.000		-		0.000	0.000	8.965	Continuing
C2P Systems Engineering Support	C/CPFF	SeaPort-E : San Diego, CA	1.176	0.720	Nov 2017	0.817	Nov 2018	0.000		-		0.000	0.000	2.713	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*	Project (Number/Name) 2126 / *ATDLS Integration*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LMMT Program Management Support	C/CPFF	SeaPort-E : San Diego, CA	1.521	0.516	Oct 2017	0.414	Nov 2018	0.000		-		0.000	0.000	2.451	Continuing
		Subtotal	51.594	2.113		2.393		0.000		-		0.000	0.000	56.100	N/A

Remarks

FY20 cost data is provided under PE 0604280N Project 2126

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	796.366	19.612		31.295		0.000		-		0.000	0.000	847.273	N/A

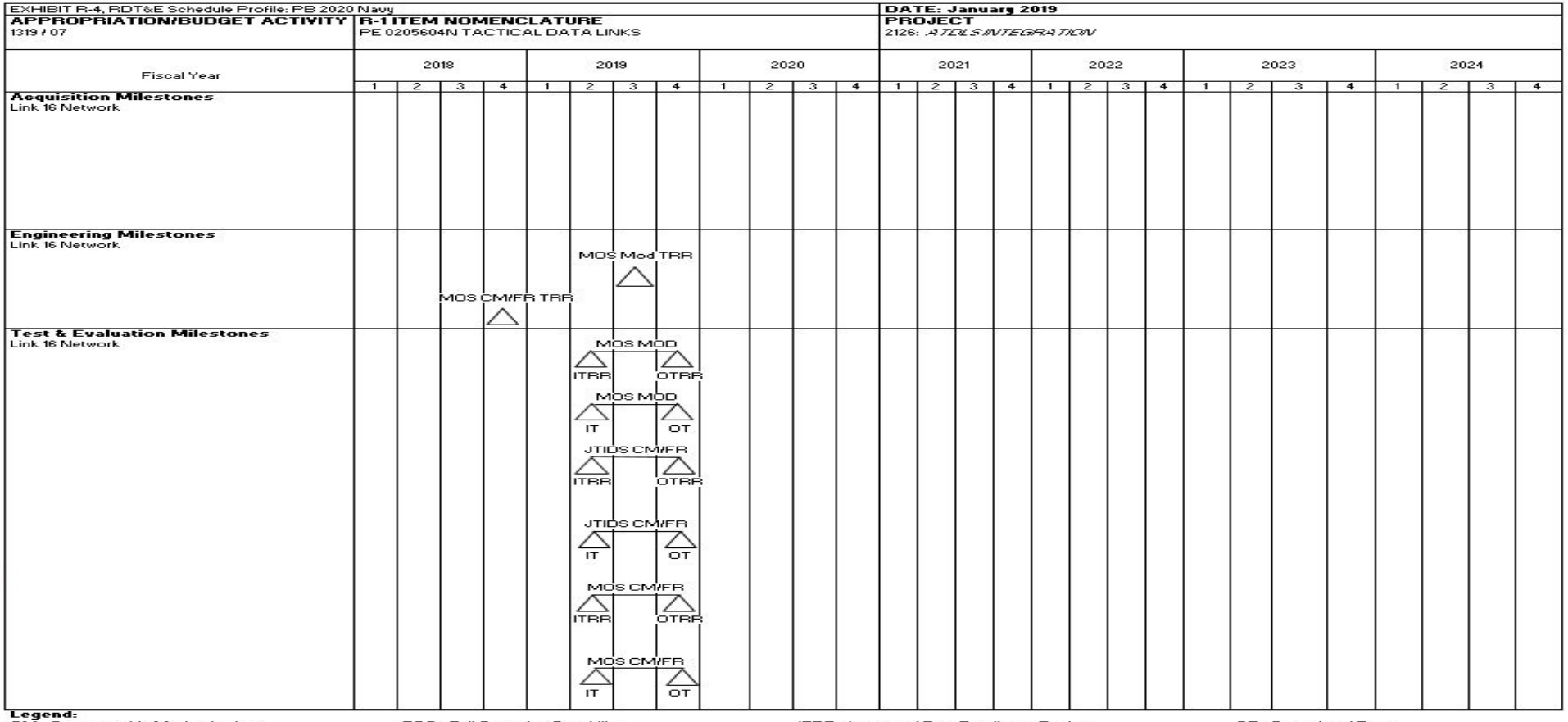
Remarks

FY20 cost data is provided under PE 0604280N Project 2126

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 2126 / *ATDLS Integration*

EXHIBIT R-4, RDT&E Schedule Profile: PB 2020 Navy

APPROPRIATION/BUDGET ACTIVITY	R-1 ITEM NOMENCLATURE	DATE: January 2019
1319 / 07	PE 0205604N TACTICAL DATA LINKS	PROJECT 2126: *ATDLS INTEGRATION*



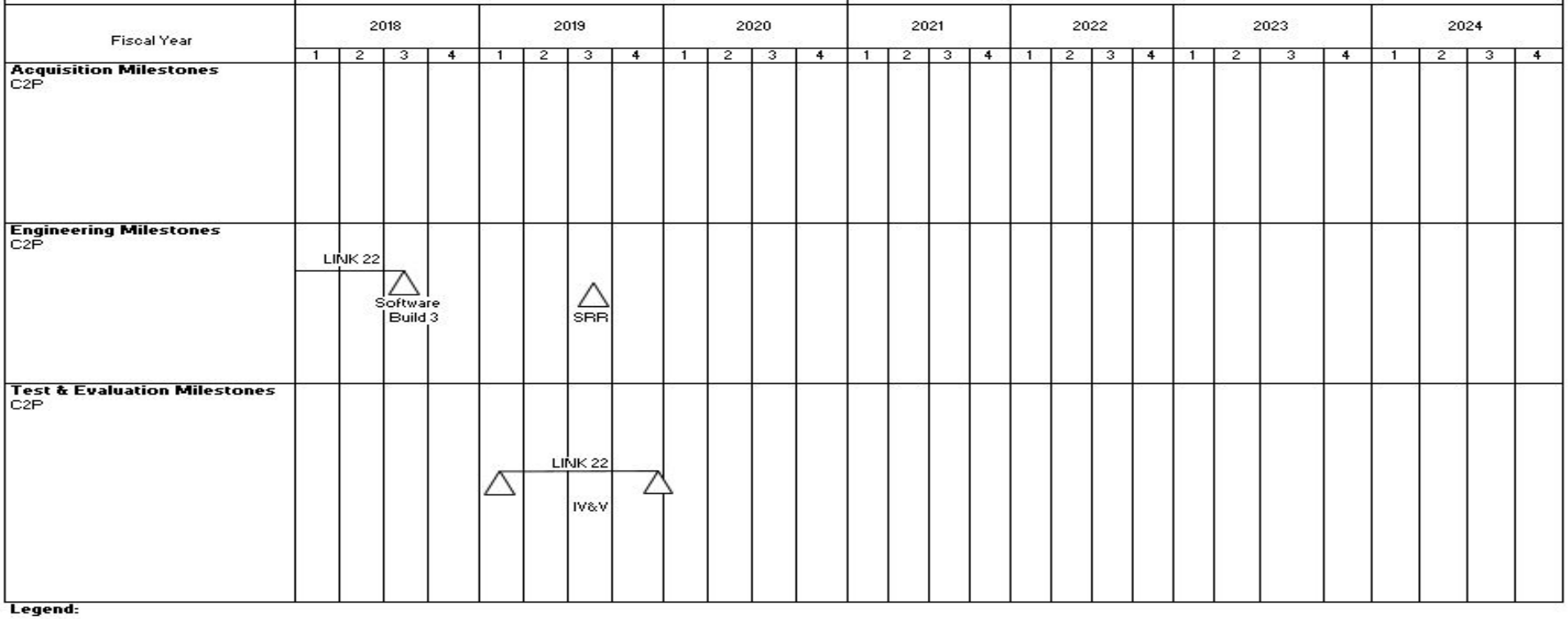
Legend:

CM - Cryptographic Modernization
DNM - Dynamic Network Management
DT - Developmental Test
DTRR - Developmental Test Readiness Review
FDR - Fielding Decision Review
FOC - Full Operating Capability
FOT&E - Follow-on Operational Test & Evaluation
FR - Frequency Remapping
IOC - Initial Operating Capability
IT - Integrated Test
ITRR - Integrated Test Readiness Review
IV&V - Independent Verificaiton and Validation
JTIDS - Joint Tactical Information Distribution System
MOS - MIDS On Ship
MOS MOD - MOS Modernization
OT - Operational Test
OTRR - Operational Test Readiness Review
PRR - Production Readiness Review
TRR - Test Readiness Review

Efforts in FY20 and out are funded under PE 0604280N Proj 2126

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 2126 / *ATDLS Integration*

EXHIBIT R-4, RDT&E Schedule Profile: PB 2020 Navy		DATE: Januarg 2019
APPROPRIATION/BUDGET AC 1319 / 07	R-1 ITEM NOMENCLATURE PE 0205604N TACTICAL DATA LINKS	PROJECT 2126: ATDLS INTEGRATION



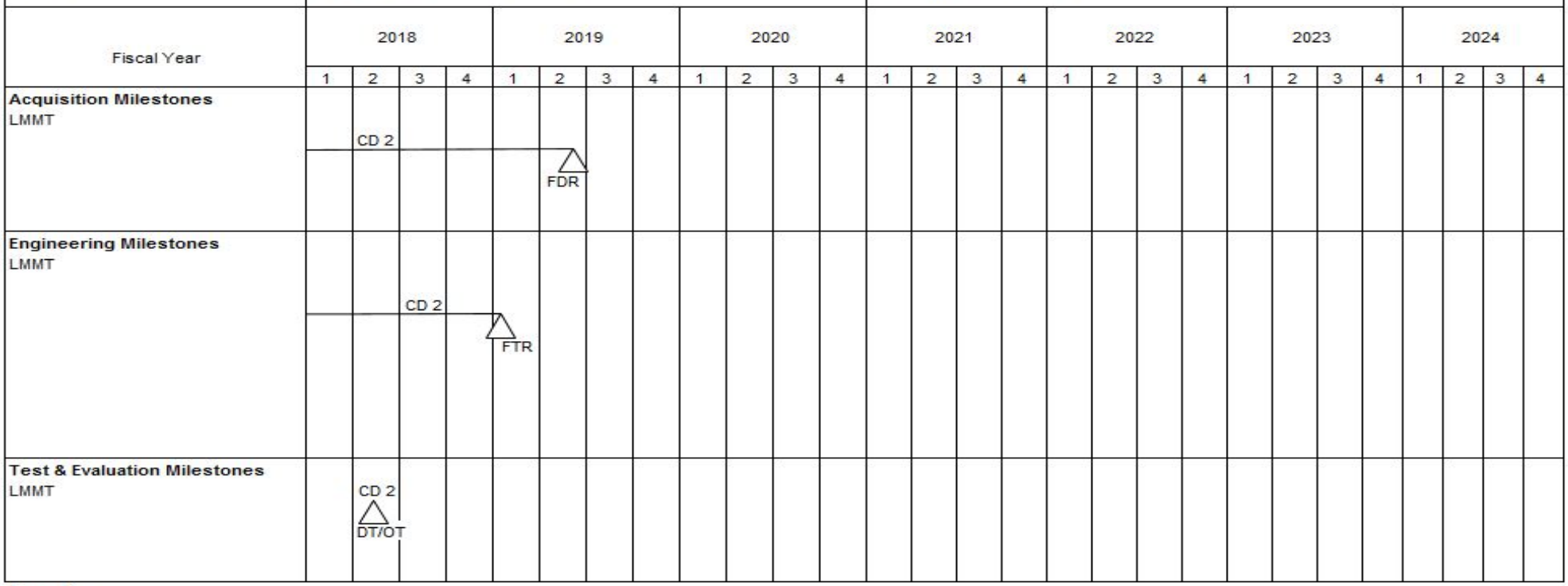
Legend:

C2P - Command and Control Processor
CDR - Critical Design Review
DT - Developmental Test
DTRR - Developmental Test Readiness Review
FDR - Fielding Decision Review
FOTE - Follow on Test and Evaluation
IOC - Initial Operating Capability
IV&V - Independent Verificaiton and Validation
OTRR - Operational Test Readiness Review
PDR - Preliminary Design Review
SRR - System Requirement Review

Efforts in FY20 and out are funded under PE 0604280N Proj 2126

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 2126 / *ATDLS Integration*

EXHIBIT R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: January 2019
APPROPRIATION/BUDGET ACTIVITY 1319 / 07	R-1 ITEM NOMENCLATURE PE 0205604N TACTICAL DATA LINKS	PROJECT 2126: ATDLS INTEGRATION



Legend:

BD - Build Decision	CD - Capability Drop	FDR - Fielding Decision Review	FTR - Fielding Technical Review	OT - Operational Test
BTR - Build Technical Review	DT - Developmental Test	FOC - Full Operational Capability	IOC - Initial Operating Capability	OTRR - Operational Test Readiness Review

Efforts in FY20 and out are funded under PE 0604280N Proj 2126

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 2126 / *ATDLS Integration*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2126				
LMMT CD 2 Developmental/Operational Testl	2	2018	2	2018
C2P Link 22 Software Build 3	3	2018	3	2018
Link 16 MOS CM/FR Test Readiness Review	4	2018	4	2018
C2P Link 22 Independed Verification and Validation	1	2019	4	2019
LMMT CD 2 Fielding Technical Review	1	2019	1	2019
Link 16 MOS Mod Test Readiness Review	3	2019	3	2019
Link 16 MOS Mod Integrated Test Readiness Review	2	2019	2	2019
Link 16 MOS Mod Integrated Test	2	2019	2	2019
Link 16 JTIDS CM/FR Integrated Test Readiness Review	2	2019	2	2019
Link 16 JTIDS CM/FR Integrated Test	2	2019	2	2019
Link 16 MOS CM/FR Integrated Test Readiness Review	2	2019	2	2019
Link 16 MOS CM/FR Integrated Test	2	2019	2	2019
LMMT CD 2 Fielding Decision Review	2	2019	2	2019
C2P Modernization Development System Requirement Review	3	2019	3	2019
Link 16 MOS Mod Operational Test Readiness Review	4	2019	4	2019
Link 16 MOS Mod Operational Test	4	2019	4	2019
Link 16 JTIDS CM/FR Operational Test Readiness Review	4	2019	4	2019
Link 16 JTIDS CM/FR Operational Test	4	2019	4	2019
Link 16 MOS CM/FR Operational Test Readiness Review	4	2019	4	2019
Link 16 MOS CM/FR Operational Test	4	2019	4	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*				Project (Number/Name) 3020 / *MIDS/JTRS*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3020: *MIDS/JTRS*	306.593	38.876	43.798	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	389.267
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 554

Note

Funding has been realigned out of PE 0205604N Project 3020, into PE 0604280N as part of RDTEN PE Consolidation starting in FY20.

A. Mission Description and Budget Item Justification

The Multifunctional Information Distribution System (MIDS) program office is the Lead Service for Department of Defense (DOD) Link 16 capability and consists of two (2) product lines, MIDS Low Volume Terminal (LVT) (legacy hardware defined radio) and MIDS Joint Tactical Radio System (JTRS) (software defined radio). MIDS-LVT effort is a cooperative development program between France, Germany, Italy, Spain, and the United States with United States joint service participation (Navy, Army, Air Force), and has provided over 11,000 terminals to 48 Nations providing interoperability with North Atlantic Treaty Organization (NATO) and coalition partners. The Department of Defense (DoD) established the program to design, develop, and deliver low volume, lightweight tactical information system terminals for U.S. and allied fighter aircraft, bombers, helicopters, ships, and ground sites. MIDS-LVT significantly increases force effectiveness and minimizes hostile actions and friend-on-friend engagements. The current development program for LVT is the Block Upgrade 2 (BU2) effort designed to meet the Cryptographic Modernization (CM) and Frequency Remapping (FR) mandates required for all US and international users which occurs inside the FYDP. MIDS-LVT BU2 was executed as an ECP and provides the critical upgrades to the MIDS-LVT Terminal to enable U.S., Coalition and International partners' ability to meet the National Security Agency (NSA) mandated timelines for CM and the National Telecommunications and Information Agency (NTIA) and Federal Aviation Agency (FAA) mandated timelines for FR.

MIDS JTRS, designed as a Pre-Planned Product Improvement (P3I) and executed as an Engineering Change Proposal (ECP) to the production MIDS-LVT configuration, and is fully compatible with MIDS-LVT. The MIDS JTRS Core Terminal achieved Full Fielding & Production (FP&F) in March 2012. It facilitated the JTRS incremental approach for fielding advanced JTRS transformational networking capability and transformed the MIDS-LVT into a 4-channel, Software Communications Architecture (SCA) compliant, Joint Tactical Radio. A form-fit-function replacement to MIDS-LVT, MIDS JTRS also adds three programmable 2 Megahertz (MHz) to 2 Gigahertz (GHz) channels capable of hosting the JTRS legacy and networking waveforms. In addition to Link 16, Tactical Air Navigation (TACAN), and voice functionality found in MIDS-LVT, MIDS JTRS has four channels and adds capabilities such as Link 16 Enhanced Throughput (ET), Link 16 Frequency Re-mapping (FR), software programmability, Cryptographic Modernization (CM), and Four Net Concurrent Multi-Netting with Concurrent Contention Receive (CMN-4).

MIDS JTRS Tactical Targeting Network Technology (TTNT), is a block upgrade to the MIDS JTRS CMN-4 Terminal provides an Internet Protocol-based networking capability on tactical aircraft. TTNT is a low latency, high throughput waveform that has the capability to support data exchange between fast-moving tactical aircraft, weapons, and unmanned aircraft, in addition to air, land, and sea-based command and control nodes, in a variety of air-to-air and air-to-ground missions including time sensitive targeting, air warfare, close air support, non-traditional ISR, and anti-surface warfare. TTNT capability integration into the MIDS JTRS directly supports Naval Integrated Fire Control (NIFC) capability requirements. These capabilities provide Joint Airborne Network-Tactical Edge functionality to run advanced mission applications in a cross-platform/cross-domain tactical network enterprise.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3020 / *MIDS/JTRS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MIDS	38.876	43.798	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: Award the MIDS JTRS Link 16 hardware transceiver upgrade full development contract (formerly MIDS Modernization Increment 2) for systems engineering requirements analysis, a joint industry/Government System Functional Review (SFR), further Link 16 transceiver design efforts, and porting of the Link 16 waveform into the new hardware transceiver. Conduct the Preliminary Design Review (PDR) to approve the Allocated Baseline (ABL), upgrade Link 16 transceiver hardware, systems integration, and continue software/firmware updates to allow the new hardware to use the Link 16 waveform and allow for the use of multi-path in the MIDS JTRS terminal. Complete MIDS JTRS Concurrent Multi-Netting with Concurrent Contention Receive (CMN-4) post Block Cycle 3 (BC3) software builds to support E-2D and MIDS on Ship (MOS) Modernization (MOS MOD) CMN-4 fielding. Complete TTNT Contractor First Article Qualification testing and began Government First Article Qualification testing. Begin developmental testing of the TTNT terminal, external powered amplifiers and high powered amplifiers for E-2D and EA-18G platform requirements. Continue MIDS systems engineering, communication security, IA and program management support. Continue with Link 16 Waveform development fixes and updates.					
FY 2020 Base Plans: FY20 funding has been realigned to PE 0604280N Project 3020 as part of PE Consolidation.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0604280N Project 3020 (JT Tact Radio Sys (JTRS)/MIDS/JTRS).					
Accomplishments/Planned Programs Subtotals	38.876	43.798	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3020 / *MIDS/JTRS*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTE/0604280N/3020: *MIDS/JTRS*	0.000	0.000	39.214	-	39.214	31.198	29.480	30.515	31.673	Continuing	Continuing

Remarks

D. Acquisition Strategy

Multifunctional Information Distribution System Joint Tactical System (MIDS JTRS) development was initiated as a major modification to the MIDS-LVT using an Engineering Change Proposal to the existing production contracts. The U.S. prime contractors from the MIDS-LVT program, Data Link Solutions (DLS) and Viasat Inc., cooperatively designed and developed each of the MIDS JTRS terminal variants and Block Upgrade 2 for MIDS-LVT. The U.S. implemented a continuous competition strategy between DLS and ViaSat that will be maintained throughout the MIDS-LVT and MIDS JTRS production phases. This strategy has been successfully used on all MIDS variants.

E. Performance Metrics

The MIDS-LVT and MIDS JTRS programs are employing mature, software-defined radio technologies and developing hundreds of thousands of lines of code. These software metrics are used to quantify the quality and progress of each software product's development over time. MIDS employs earned value metrics to monitor contract performance on its prime development contracts, as required.

MIDS-LVT: The 11 performance measures are: Link 16 Waveform Compatibility, Link 16 Message Standards, Link 16 IER; Interoperability, Link 16 Coded Error Message Probability, Weight/Volume, Link 16 JAM Resistance, Link 16 Voice Channels, Link 16 Communication Range Data, Link 16 Communications Range Voice, Link 16 Relay.

MIDS JTRS: The 15 performance measures are: Link 16 Waveform Compatibility, Link 16 Waveform Standards, Link 16 Coded Error Message Probability, Link 16 Jamming Resistance, Link 16 Communication Range-Data, Link 16 Communications Range-Voice, Link 16 Relay, Start-up (Terminal Single Channel), Operational Communications - Passive Synchronization, Operational Communications - Automatic Message Acknowledgement, Operational Communications - Multi-Net, Operational Communications, Crypto Control, Navigation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3020 / *MIDS/JTRS*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development Prior Years	Various	Various : Various	254.622	0.000		0.000		0.000		-		0.000	0.000	254.622	254.622
BU2 Integration	C/CPFF	Lockheed Martin : Bethesda, MD	0.500	1.500	Nov 2017	0.000		0.000		-		0.000	0.000	2.000	2.000
TTNT Development Contract (L Band)	C/CPFF	DLS : Cedar Rapids, IA	10.831	11.245	Nov 2017	2.361	Oct 2018	0.000		-		0.000	0.000	24.437	Continuing
TTNT Development Contract (L Band)	C/CPFF	ViaSat : San Diego, Ca	1.020	4.861	Apr 2018	1.886	Jan 2019	0.000		-		0.000	0.000	7.767	Continuing
Link 16 Waveform Development	WR	SSC PAC : San Diego, CA	3.093	0.551	Oct 2017	0.775	Nov 2018	0.000		-		0.000	0.000	4.419	Continuing
MIDS Mod Inc 2 Risk Reduction	C/CPFF	DLS : Cedar Rapids, IA	2.747	4.397	Nov 2017	0.000		0.000		-		0.000	0.000	7.144	5.367
MIDS Mod Inc 2 Risk Reduction	C/CPFF	ViaSat : San Diego, CA	1.779	4.324	Jan 2018	0.000		0.000		-		0.000	0.000	6.103	3.684
Investigation Reports	C/CPFF	DLS : Cedar Rapids, IA	0.381	0.894	Nov 2017	0.150	Dec 2018	0.000		-		0.000	0.000	1.425	1.556
Investigation Reports	C/CPFF	Viasat : San Diego	0.067	0.735	Feb 2018	0.000		0.000		-		0.000	0.000	0.802	0.792
High Powered Amplifier	C/CPFF	TBD : TBD	0.000	0.300	Sep 2018	0.000		0.000		-		0.000	0.000	0.300	0.223
Link 16 hardware upgrade	C/CPFF	DLS : Cedar Rapids, IA	0.000	0.000		17.945	Feb 2019	0.000		-		0.000	0.000	17.945	Continuing
Link 16 hardware upgrade	C/CPFF	ViaSat : San Diego, CA	0.000	0.000		11.963	Feb 2019	0.000		-		0.000	0.000	11.963	Continuing
MIDS JTRS BU2/BC0/1/2 (ER3A&3B) (MIDS JTRS BC3+)	C/CPFF	DLS : Cedar Rapids, IA	0.000	4.804	Mar 2018	1.872	Mar 2019	0.000		-		0.000	0.000	6.676	4.804
MIDS JTRS BU2/BC0/1/2 (ER3A&3B) (MIDS JTRS BC3+)	C/CPFF	ViaSat : San Diego, CA	0.000	0.883	Mar 2018	0.403	Mar 2019	0.000		-		0.000	0.000	1.286	0.883
MIDS JTRS TTNT Development Problem Reports	C/CPFF	TBD : TBD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	0.321
MIDS JTRS TTNT Reliability Growth	C/CPFF	TBD : TBD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	1.100

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*	Project (Number/Name) 3020 / *MIDS/JTRS*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	275.040	34.494		37.355		0.000		-		0.000	0.000	346.889	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Modeling and Simulation	MIPR	MIT Lincoln Labs : Lexington, MA	0.000	0.000		0.500	Nov 2018	0.000		-		0.000	0.000	0.500	-
Multi-level security analysis	WR	NAVAIR : China Lake, Ca	0.000	0.393	Nov 2017	0.000		0.000		-		0.000	0.000	0.393	0.393
Modeling and Simulation	WR	NAVAIR : China Lake, Ca	3.874	0.808	Mar 2018	0.400	Jan 2019	0.000		-		0.000	0.000	5.082	Continuing
		Subtotal	3.874	1.201		0.900		0.000		-		0.000	0.000	5.975	N/A

Remarks

Consolidated Automated Support System (CASS) Test Program Sets (TPS)

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Eval Prior Years	Various	Various : Various	8.144	0.000		0.000		0.000		-		0.000	0.000	8.144	8.144
MIDS JTRS CMN-4/MIDS Mod GFAQT and JTEL LAB	WR	SSC : San Diego, CA	1.237	0.248	Dec 2017	0.205	Oct 2018	0.000		-		0.000	0.000	1.690	Continuing
COMOPTEVFOR	MIPR	COMOPTEVFOR : Norfolk, VA	0.000	0.056	Jul 2018	0.038	Jan 2019	0.000		-		0.000	0.000	0.094	0.056
TTNT DT/OT Support	WR	TBD : TBD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	1.600
JTEL Testing Support	C/CPFF	G-2 : San Diego, CA	0.095	0.042	Nov 2017	0.095	Mar 2019	0.000		-		0.000	0.000	0.232	Continuing
		Subtotal	9.476	0.346		0.338		0.000		-		0.000	0.000	10.160	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3020 / *MIDS/JTRS*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services Prior Years	Various	Various : Various	1.201	0.000		0.000		0.000		-		0.000	0.000	1.201	1.201
Systems Engineering Support	MIPR	MITRE : Bedford, MA	6.210	1.493	Nov 2017	0.806	Jan 2019	0.000		-		0.000	0.000	8.509	Continuing
Government Engineering Support TTNT	WR	SSC : San Diego, CA	8.155	0.816	Oct 2017	2.072	Dec 2018	0.000		-		0.000	0.000	11.043	Continuing
Govt Program Support NIFC-CA	WR	NAVAIR : Pax River, MD	0.939	0.030	Nov 2017	0.058	Nov 2018	0.000		-		0.000	0.000	1.027	0.969
Infomation Assurance	MIPR	CERDEC : Aberdeen Proving Ground, MD	0.000	0.000		0.268	Jan 2019	0.000		-		0.000	0.000	0.268	-
COR and Logistics Support	WR	SSC : Charleston, SC	0.076	0.075	Nov 2017	0.064	Nov 2018	0.000		-		0.000	0.000	0.215	Continuing
Information Assurance	MIPR	NSA : Fort Meade, MD	0.051	0.055	Mar 2018	0.000		0.000		-		0.000	0.000	0.106	Continuing
Contractor Engineering/ Programmatic Support	C/CPFF	Sentek : San Diego, Ca	1.179	0.270	Sep 2018	0.682	Nov 2018	0.000		-		0.000	0.000	2.131	Continuing
ARL SIPRNET Connection	MIPR	ARL : Adelphi, MD	0.096	0.096	Jan 2018	0.101	Jan 2019	0.000		-		0.000	0.000	0.293	Continuing
Contractor Program Management and Financial Support	C/CPFF	G2 : San Diego, CA	0.296	0.000		1.154	Nov 2018	0.000		-		0.000	0.000	1.450	Continuing
		Subtotal	18.203	2.835		5.205		0.000		-		0.000	0.000	26.243	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	306.593	38.876		43.798		0.000		-		0.000	0.000	389.267	N/A

Remarks

FY20 cost data is provided under PE 0604280N Project 3020.

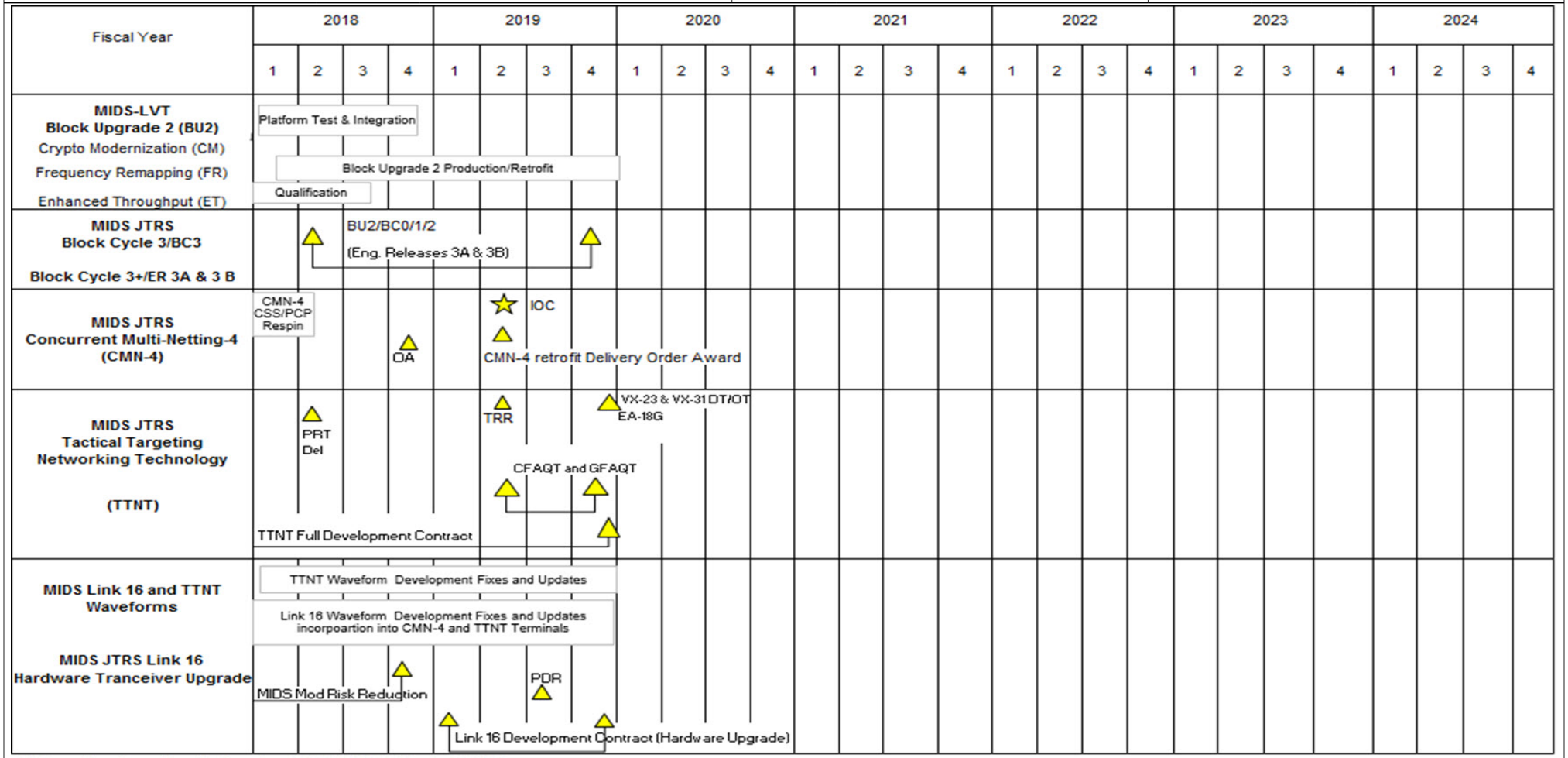
LCM - MIDS-LVT Crypto Module WF - Waveform BU2 - Block Upgrade 2 BC3 - Block Cycle 3
TTNT - Tactical Targeting Network Technology CSS/PCP - Cryptographic Sub System/Protected Core Processor
ER0F - Engineering Release 0F ER0G - Engineering Release 0G DLS - Data Link Solutions
NIFC-CA - Naval Integrated Fire Control - Counter Air PDR - Preliminary Design Review CDR - Critical Design Review
TRR - Test Readiness Review DT - Development Test IR - Information Repository JTEL - Joint Test and Evaluation Lab

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*	Project (Number/Name) 3020 / *MIDS/JTRS*	

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

CFAQT - Contractor First Article Qualification Test GFAQT - Gov't First Article Qualification Test

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3020 / *MIDS/JTRS*



FY20 and out are funded under PE 0604280N Project 3020.

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3020 / *MIDS/JTRS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MIDS				
MIDS-LVT Block Upgrade 2 (BU2/CM/FR/ET): Qualification and Certification/FAQT	1	2018	3	2018
MIDS-LVT Block Upgrade 2 (BU2/CM/FR/ET): Block Upgrade 2 Production/Retrofit	1	2018	4	2019
MIDS-LVT Block Upgrade 2 (BU2/CM/FR/ET): Platform Test and Integration	1	2018	4	2018
MIDS JTRS Block Cycle 3 (BC3): Block Cycle 3+ (ER 3A & 3B)	2	2018	4	2019
MIDS JTRS Concurrent Multi-Netting-4 (CMN-4): Operational Assessment	4	2018	4	2018
MIDS JTRS Concurrent Multi-Netting-4 (CMN-4): CMN-4 Retrofit Delivery Order	2	2019	4	2019
MIDS JTRS Concurrent Multi-Netting-4 (CMN-4): CMN-4 CSS/PCP Respin	1	2018	2	2018
MIDS JTRS Tactical Targeting Networking Technology (TTNT): TTNT Full Development Contract	1	2018	4	2019
MIDS JTRS Tactical Targeting Networking Technology (TTNT): PRT Deliveries	2	2018	2	2018
MIDS JTRS Tactical Targeting Networking Technology (TTNT): CFAQT and GFAQT	2	2019	4	2019
MIDS JTRS Tactical Targeting Networking Technology (TTNT): TTNT Technolgy Readiness Review (TRR)	2	2019	2	2019
MIDS JTRS Tactical Targeting Networking Technology (TTNT): Developmental Test/ Operational Assessment	4	2019	4	2019
MIDS Link 16 and TTNT Waveform: Link 16 Waveform Development Fixes and Updates	1	2018	4	2019
MIDS Link 16 and TTNT Waveform: TTNT Waveform Development Fixes and Updates	1	2018	4	2019
MIDS JTRS Link 16 Hardware Tranceiver Upgrade: MIDS Modernization (Now Link 16 hardware) Spec Development/Risk Reduction	1	2018	4	2018
MIDS JTRS Link 16 Hardware Tranceiver Upgrade: Link 16 hardware Full Development Effort	2	2019	4	2019
MIDS JTRS Link 16 Hardware Tranceiver Upgrade: MIDS Mod PDR	3	2019	3	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*	Project (Number/Name) 3341 / *Network Tactical Common Data Link*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3341: *Network Tactical Common Data Link*	86.100	17.035	13.886	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	117.021
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Funding has been realigned out of PE 0205604N Project 3341, into PE 0604280N as part of RDTEN PE Consolidation starting in FY20.

A. Mission Description and Budget Item Justification

Network Tactical Common Data Link (NTCDL) provides the ability to transmit/receive real-time Intelligence, Surveillance, and Reconnaissance (ISR) data simultaneously from multiple sources (surface, airborne, sub-surface, man-portable), and exchange command and control information (voice, data, imagery, and Full Motion Video) across dissimilar joint, service, coalition, and civil networks. NTCDL provides warfighters with the capability to support multiple, simultaneous, networked operations with currently fielded Common Data Link (CDL)-equipped air platforms (e.g. F/ A-35, P-3, and MH-60R), in addition to next generation manned and unmanned platforms (e.g., P-8, Triton, MQ-25 (Stingray), small tactical unmanned aircraft systems (STUAS) and Fire Scout). NTCDL is an incremental capability (surface, airborne, sub-surface, man-portable) providing modular, scalable, multiple-link networked communications. NTCDL benefits the fleet by providing a horizon extension for line-of-sight sensor systems for use in time-critical strike missions and supports tasking, collection, processing, exploitation, and dissemination (TCPED) via its ISR networking capability. NTCDL supports Resilient Command and Control (RC2) through its relay capability, and supports TCPED through its ISR networking capability.

Network Tactical Common Data Link (NTCDL) High Capacity Backbone (HCB) efforts support Joint Aerial Layer Network-Maritime (JALN-M) System of Systems development, integration, and testing. Efforts included the development of capabilities to integrate shipboard NTCDL terminals with the HCB in an Anti-Access/Area Denial (A2/AD) environment. JALN-M is the Navy implementation of the JALN-M architecture which provides assured communications in any environment. Flight test demonstration completed in FY18.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Network Tactical Common Data Link (NTCDL)	16.535	13.886	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: NTCDL is the only High Data Rate (HDR), Line of Sight (LOS) solution delivering Intelligence, Surveillance, and Reconnaissance (ISR), sensor control information and unmanned aircraft system (UAS) command and control. NTCDL uses Joint Department of Defense specifications for Common Data Link (CDL) waveforms and LOS networks across the allocated CDL frequency spectrum. New technical specifications require increasing number of simultaneous CDL links to support increasing number of CDL/ISR platforms and missions. The software for NTCDL is developed by both contractor and government. The contractor software development is responsible for the internal control of the NTCDL hardware whereas the Government Furnished					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3341 / *Network Tactical Common Data Link*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Software (GFS) is responsible for interfacing with various external networks (e.g. Automated Digital Network System (ADNS)) and users (e.g. Consolidated Afloat Networks and Enterprise Services (CANES)). EDM development is a multi-year effort with delivery planned in FY 2021. ***FY 2019 Plans:*** FY 2019 plans include the continued development of the three major components of Network Tactical Common Data Link's (NTCDL) Engineering Design Model (EDM): 1) the contractor developed Link Control Subsystem (LCS) software, 2) Government Furnished Software (GFS), and 3) the contractor developed hardware subsystems (Phased Array Antenna (PAA), End Cryptographic Unit (ECU), Below Deck Equipment (BDE) racks, and radio terminals). The prime vendor will begin porting, integrating, and testing Common Data Link (CDL) waveforms. Conduct Critical Design Review (CDR) with the vendor to review and approve the final engineering product baseline. Begin documentation development for the Software Development Plan (SDP) and subsystem Interface Design Descriptions (IDD). Continue development of test plans to support future Developmental Test and Operational Assessment (DT/OA). Continue logistics efforts, including provisioning conference, Navy Training Systems Plan (NTSP), and Maintenance demonstration (M-Demo). Complete acquisition documentation updates to the Cost Analysis Requirements Document (CARD) and start the development of the Capabilities Production Document (CPD). Completion of incremental capability of government developed software (implementation of software interface and security and configuration settings) and external networks application integration testing (i.e. Consolidated Afloat Networks and Enterprise Service (CANES) and Automated Digital Network System (ADNS)). Conduct an In-Process Review (IPR) for delivery of GFS incremental capability. Continue the Risk Management Framework (RMF) process in support of cybersecurity requirements. ***FY 2020 Base Plans:*** FY20 funding has been realigned to PE 0604280N Project 3341 as part of PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under PE 0604280N Project 3341.					
Title: Network Tactical Common Data Link (NTCDL) High Capacity Backbone (HCB)	0.500	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3341 / *Network Tactical Common Data Link*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Network Tactical Common Data Link (NTCDL) High Capacity Backbone (HCB) efforts support Joint Aerial Layer Network-Maritime (JALN-M) System of Systems development, integration, and testing. Efforts include the development of capabilities to integrate shipboard NTCDL terminals with the HCB in an Anti-Access/ Area Denial (A2/AD) environment. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	17.035	13.886	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2950: *NTCDL*	0.000	0.000	0.000	-	0.000	0.000	20.052	20.456	20.865	Continuing	Continuing
• RDTEN/0604280N/3341: *NTCDL*	0.000	0.000	32.432	-	32.432	35.837	7.861	6.156	6.279	Continuing	Continuing

Remarks

D. Acquisition Strategy

NTCDL will utilize the evolutionary acquisition approach for: surface, air, sub-surface, man-portable.

E. Performance Metrics

Conformance to meet Joint Interoperability Test Command (JITC) Certification requirements for CDL waveforms.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*	Project (Number/Name) 3341 / *Network Tactical Common Data Link*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	Various	Various : Various	20.862	0.000		0.000		0.000		-		0.000	0.000	20.862	-
NTCDL Product Development	C/CPIF	BAE Systems, Int : Wayne, NJ	22.364	10.705	Dec 2017	6.848	Dec 2018	0.000		-		0.000	0.000	39.917	-
NTCDL HCB Development	WR	SPAWARSYSCTR : San Diego, CA	5.393	0.500	Nov 2017	0.000		0.000		-		0.000	0.000	5.893	-
NTCDL Software Development	WR	SPAWARSYS : San Diego, CA	3.074	1.868	Nov 2017	2.177	Nov 2018	0.000		-		0.000	0.000	7.119	-
NTCDL Software Development	C/IDIQ	Technology Unlimited Group : San Diego, CA	0.000	1.021	Jan 2018	0.814	Nov 2018	0.000		-		0.000	0.000	1.835	-
		Subtotal	51.693	14.094		9.839		0.000		-		0.000	0.000	75.626	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Systems Engineering	WR	SPAWARSYSCTR : San Diego, CA	14.072	0.925	Oct 2017	1.853	Oct 2018	0.000		-		0.000	0.000	16.850	-
NTCDL Systems Engineering	C/IDIQ	Technology Unlimited Group : San Diego, CA	9.546	0.000		0.554	Oct 2018	0.000		-		0.000	0.000	10.100	-
		Subtotal	23.618	0.925		2.407		0.000		-		0.000	0.000	26.950	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Test and Evaluation	WR	SPAWARSYSCTR : San Diego, CA	4.821	0.948	Oct 2017	0.680	Oct 2018	0.000		-		0.000	0.000	6.449	-
NTCDL Test and Review	MIPR	JITC : Fort Huachuca, AZ	0.514	0.015	Jan 2018	0.018	Feb 2019	0.000		-		0.000	0.000	0.547	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205604N / *Tactical Data Links*	Project (Number/Name) 3341 / *Network Tactical Common Data Link*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTCDL Waveform certification	MIPR	COMOPTEVFOR : Norfolk, VA	0.375	0.303	Aug 2018	0.085	Feb 2019	0.000		-		0.000	0.000	0.763	-
		Subtotal	5.710	1.266		0.783		0.000		-		0.000	0.000	7.759	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	WR	SPAWARSYSCTR : San Diego, CA	1.000	0.000		0.000		0.000		-		0.000	0.000	1.000	-
Program Management Support	C/CPFF	BAH : San Diego, CA	4.079	0.750	Feb 2018	0.857	Nov 2018	0.000		-		0.000	0.000	5.686	-
		Subtotal	5.079	0.750		0.857		0.000		-		0.000	0.000	6.686	N/A

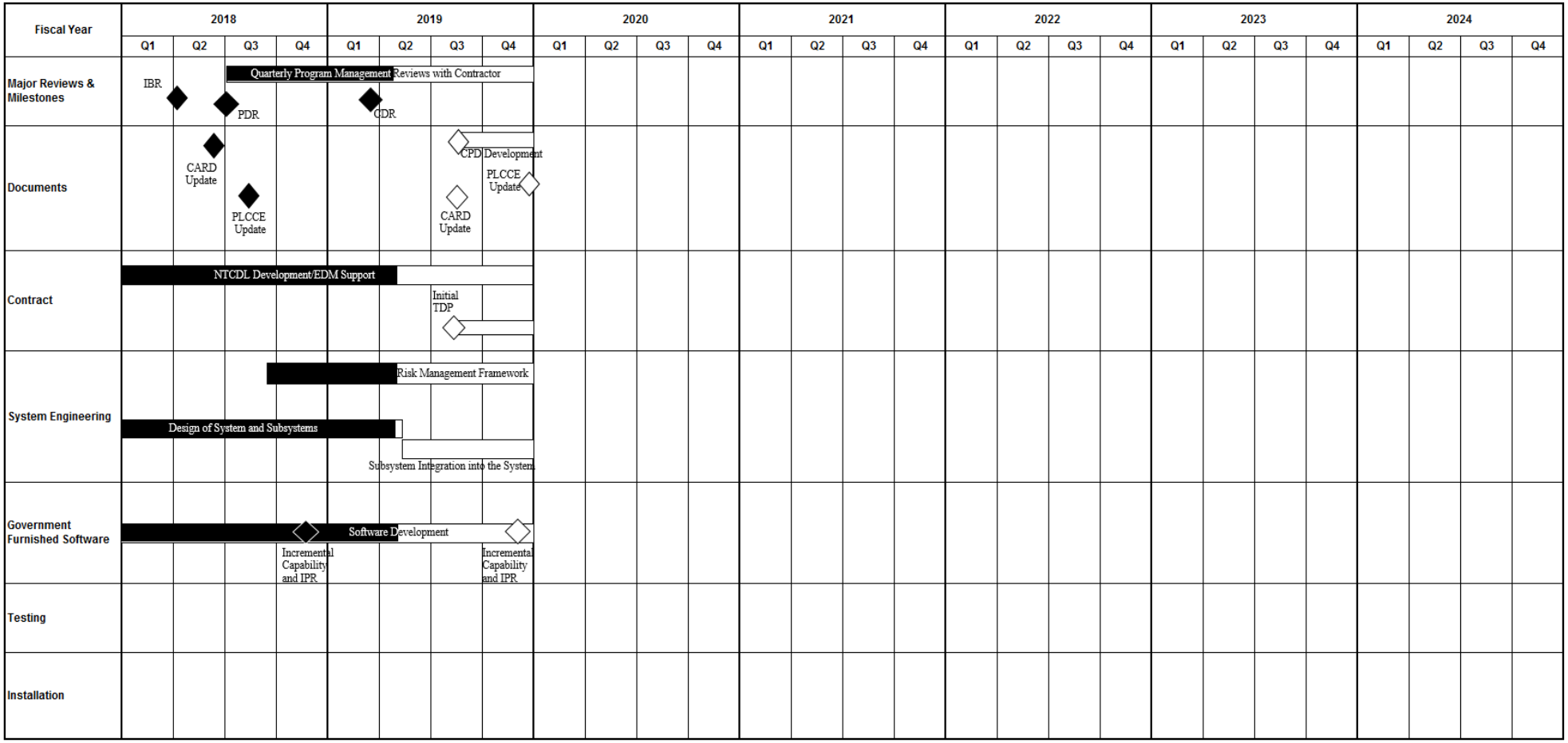
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	86.100	17.035		13.886		0.000		-		0.000	0.000	117.021	N/A

Remarks

FY20 cost data is provided under PE 0604280N Project 3341.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3341 / *Network Tactical Common Data Link*

NTCDL



• Note: Efforts in FY20 and out are funded under PE 0604280N Project 3341 (new PE/Project).

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205604N / *Tactical Data Links*	**Project (Number/Name)** 3341 / *Network Tactical Common Data Link*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3341				
NTCDL - Design of System and Subsystems	1	2018	2	2019
NTCDL - Government Furnished Software (GFS) Development	1	2018	4	2019
NTCDL - Development Contract	1	2018	4	2019
NTCDL - Initial Baseline Review (IBR)	2	2018	2	2018
NTCDL - Cost Analysis Requirements Document (CARD) Update 1	2	2018	2	2018
NTCDL - Preliminary Design Review (PDR)	3	2018	3	2018
NTCDL - Program Life Cycle Cost Estimate (PLCCE) Update 1	3	2018	3	2018
NTCDL - Risk Management Framework (RMF)	3	2018	4	2019
NTCDL - Quarterly Program Management Reviews with Contractor	3	2018	4	2019
NTCDL - Incremental Capability and In-Process Review (IPR) 1	4	2018	4	2018
NTCDL - Critical Design Review (CDR)	1	2019	1	2019
NTCDL - Subsystem Integration into the System	2	2019	4	2019
NTCDL - Initial Technical Data Package (TDP)	3	2019	4	2019
NTCDL - CARD Update 2	3	2019	3	2019
NTCDL - Capability Production Document (CPD) Development	3	2019	4	2019
NTCDL - IPR 2	4	2019	4	2019
NTCDL - PLCCE Update 2	4	2019	4	2019

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205620N *I Surface ASW Cmbt Sys Integr*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	263.743	28.410	26.321	29.572	-	29.572	29.323	29.876	30.474	31.080	Continuing	Continuing
1916: *Surface ASW System Improvement*	263.743	28.410	26.321	29.572	-	29.572	29.323	29.876	30.474	31.080	Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this Program Element (PE) is to significantly improve existing Surface Ship Undersea Warfare (USW) sonar system capabilities through quick and affordable development/integration of emergent, transformational technologies in support of Littoral Anti-Submarine Warfare (ASW), Theater ASW (TASW), and overall efforts required to pace the threat. Detection and classification play uniquely vital roles in the success of any ASW campaign. The Advanced Capability Build (ACB) spiral development process is the primary means by which these USW improvements are developed.

USW remains a Navy core competency in a dynamic and uncertain maritime environment. U.S. adversaries continue to develop asymmetric capabilities and capacities to deter, disrupt, or delay the entry of U.S. and allied naval forces, and pose a constant challenge as we implement the Maritime Strategy. Evolving submarine technologies offer enhanced stealth, speed, endurance, weapons, and operational proficiency, foretelling that the adversary submarine of the future will have a significantly larger sphere of influence, while presenting less vulnerability to USW forces. The effective offensive engagement range of the adversary submarine of the future will continue to match or outrange individual U.S. and multinational platform sensors and weapons in many tactical environments. Submarines are an increasing threat to all Naval and Allied ships, particularly modern diesel subs and faster torpedoes. Not only can the presence of potential hostile submarines delay naval combatant action until they are located and neutralized, submarines can also disrupt all seaborne logistics supply for any ground campaign as well as maritime commerce. USW forces must be effective in all operating environments, ranging from the deep open ocean to the littorals, and are key to countering adversarial anti-access and area denial strategies.

This Project takes advantage of the AN/SQQ-89(V) Open System Architecture (OSA) and Acoustic Rapid Commercial-Off-The-Shelf (COTS) Insertion (ARCI) initiatives to integrate Torpedo Detection, Classification, and Localization (TDCL) and ASW sonar combat system capability improvements. This COTS-based Surface Ship ASW combat system, the AN/SQQ-89A(V)15, is planned as a backfit program for both CG47 (select CG59-73 Baseline 3 and 4 ships) and DDG51 class ships. The Open Architecture (OA) system enables the ACB process and provides budget flexibility to make COTS/OA technology solutions and ARCI-type initiatives affordable. Improvements are tested in the laboratory and at-sea.

USW technology implementation will take advantage of improvements developed under the submarine Advanced Processing Build (APB) and Advanced Surveillance Build (ASB) programs and will in turn share unique improvements developed under this program with the submarine and surveillance USW communities. The ACB and APB programs are managed under a common development organization and process titled AxB. While each platform retains its uniqueness and focus in functional domains essential to mission success, a premium is placed on development of common capabilities and modular architecture technologies to maximize commonality and cost effectiveness.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205620N *I Surface ASW Cmbt Sys Integr*

This Project participates in, and takes advantage of the Tactical Advancements for the Next Generation (TANG) initiative that utilizes Commercial Industrial Design Thinking methodologies to engage the Fleet in generating innovative USW improvement concepts.

This Project includes funding for the Surface Ship Engineering Measurement Program (SSEMP), which will measure the performance of existing and new Surface Ship ASW combat systems and enables data-based assessment of the capabilities and shortfalls in the performance of these systems in realistic scenarios.

This Project includes funding to support cyber security initiatives to align future AN/SQQ-89A(V)15 baselines with future AEGIS Integrated Combat Systems.

This Project contributes to the development of Littoral Combat Ship (LCS) ASW Mission Packages and the Frigate (FFG(X)) program.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	29.351	28.421	29.766	-	29.766
Current President's Budget	28.410	26.321	29.572	-	29.572
Total Adjustments	-0.941	-2.100	-0.194	-	-0.194
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.100			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.941	0.000			
• Program Adjustments	0.000	0.000	-0.055	-	-0.055
• Rate/Misc Adjustments	0.000	0.000	-0.139	-	-0.139

Change Summary Explanation

FUNDING:

- FY 2018 decrease of -$0.941M reflects a Small Business Innovative Research (SBIR) transfer.
- FY 2019 decrease of -$2.100M was for a Congressionally directed reduction to the AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade program.
- FY 2020 decrease of -$0.055M for Contractor Services Reform reduction and -$0.139M various rate adjustments.

- FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 ($26.321M) to FY 2020 ($29.572M) increase (+$3.251M) reflects: 1) the incorporation of a -$2.100M FY 2019 Congressionally directed reduction to the AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade program, and, 2) the funding of additional efforts in FY 2020 required for the AN/SQQ-89A(V)15 Surface Ship ASW ACB Development program to update facilities and processes to harden the day-to-day business practices of the ACB program against cyber attacks.

SCHEDULE: Added ACB-19 Step 4 At-Sea Test in 3Q20, and added ACB-21 Step 4 At-Sea Test in 3Q22.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0205620N / *Surface ASW Cmbt Sys Integr*				Project (Number/Name) 1916 / *Surface ASW System Improvement*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
1916: *Surface ASW System Improvement*	263.743	28.410	26.321	29.572	-	29.572	29.323	29.876	30.474	31.080	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Surface ASW Systems Improvements Project will support essential performance enhancements to AN/SQQ-89(V) and Surface Ship Sonar Systems. This project will improve AN/SQQ-89(V) Measures of Performance (MOP) by enhancing operator interface methods and tools, active and passive detection, tracking, classification and localization, torpedo DCL, and sonobuoy data processing and display capabilities, and increasing acoustic sensor frequency bandwidth (Operational Requirements Document #667-76-05 titled 'AN/SQQ-89 Improvement Program'), Test & Evaluation Master Plan (TEMP) 802-2.

This project will take advantage of the TANG initiative, AN/SQQ-89(V) OSA, and ARCI initiatives to integrate a TDCL and ASW sonar and combat system capability improvements. This COTS-based Surface Ship ASW combat system, the AN/SQQ-89A(V)15, is currently planned as a backfit program for both CG 47 (select CG59-73 Baseline 3 and 4 ships) and DDG 51 (All DDG 51 and follow FLT I/II/IIA) class ships. This project has delivered the AN/SQQ-89A(V)15 Pre-Production Prototype, performed installation on board CG73, and conducted subsequent Developmental Test & Evaluation (DT&E) and Initial Operational Test & Evaluation (IOT&E) where the system was found 'Operationally Effective' by Command Operational Test and Evaluation Force (COMOPTEVFOR).

The OSA and high performance COTS processing hardware on ships fielded with the AN/SQQ-89A(V)15 combat system provides an opportunity to integrate emergent, transformational USW technological improvements that were previously unachievable. The USW suites on these ships will require periodic upgrades to remain effective well into the 21st century and to pace the threat. Software upgrades target capability increases in high interest areas as prescribed by the Fleet and captured in campaign analysis. To achieve this, this project will package and deliver incremental upgrades every two years to the AN/SQQ-89A(V)15 production program via an ACB spiral development process (ACB-15, ACB-17, etc.) by inserting maturing USW technologies.

Primary areas of USW improvement are as follows:
- Undersea Fire Control/Engagement
- Medium Frequency (MF) Pulsed Active Sonar
- Continuous Active Sonar (CAS)
- Acoustic Communications
- TDCL
- Torpedo Defense
- Passive Sonar
- Sonar Tactical Decision Aids (STDA)

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: AN/SQQ-89A(V)15 Surface Ship ASW Advanced Capability Build (ACB) Development	20.310	21.191	21.561	0.000	21.561
Articles:	-	-	-	-	-

Description: Develop enhancements to the AN/SQQ-89A(V)15 Open System Architecture (OSA) via the integration of transformational technologies through the four step ACB spiral development process, enhanced by the TANG initiative. These items will be integrated and delivered to the CG 47 and DDG 51 class AN/SQQ-89A(V)15 backfit production programs via ACB updates.

The ACB four step process:
Step 1 - algorithm/technology assessment by peer review panels of Subject Matter Experts (SME) to down-select technologies and assist developers with technical guidance.
Step 2 - algorithm/technology testing with open and closed data sets to further down-select and refine capabilities prior to integration and testing.
Step 3 - land based system-level testing in a realistic tactical environment.
Step 4 - at-sea testing on an operational surface combatant. Step 4 is conducted only if an appropriate platform is available.

ACB rapidly addresses problems/deficiencies in processing, capability or operations within the following areas of the AN/SQQ-89(V) USW combat system architecture; sensor processing, acoustics, fire control, contact management, performance prediction, operator productivity and on-board training, Multi-Function Towed Array (MFTA), Digital Fire Control Interface (DFCI), Mid-Frequency Active (MFA) processing, TDCL, Torpedo Defense and adaptive beamforming.

ACB requirements are generated through discussions with the Fleet, then vetted and provided as direction by CNO, N96. Steps 1 and 2 are conducted in a pipeline style parallel to system integration and production. This makes Steps 1 and 2 independent of any particular Build (e.g ACB-15) and allows for development of longer lead technologies. The content of a specific ACB build (every two years on the odd year) is then determined through a series of discussions with the Fleet aimed at selecting the most relevant and mature technologies available in the ACB pipeline. Integration at the String and System level is then performed followed by Steps 3 and 4, as applicable, and transitioned to production.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Additionally, advanced development capabilities from the submarine APB and ASB projects are re-used in ACB, as appropriate. ACB capabilities are also shared with submarine APB and ASB. The ACB development program also resolves issues/deficiencies discovered through the AN/SQQ-89(V) Test & Evaluation program. ***FY 2019 Plans:*** - Complete Technical Insertion-20 (TI-20) trade studies to support ACB-19 integration and ACB-21 development. - Conduct and complete Step 3 land-based testing of ACB-19. - Conduct ACB-19 Return-On-Investment (ROI) testing. - Transition ACB-19 to production. - Initiate planning and development for ACB-21. Anticipate developing capabilities to improve the attack/engage phase of the kill chain, improve contact localization, improve sonobuoy processing, and increase performance of a ship as a contributor to strike group performance. - Continue Common STDA development. - Conduct planning for Step 4 testing of ACB-19. ***FY 2020 Base Plans:*** - Continue the development and initiate the integration of enhancements to AN/SQQ-89A(V)15 for ACB-21. Anticipate developing capabilities to improve the attack/engage phase of the kill chain, improve contact localization, improve sonobuoy processing, and increase performance of a ship as a contributor to strike group performance. - Conduct system integration and commence test preparation of ACB-21 for Step 3 land-based testing. - Conduct TI-22 trade studies to support ACB-21 integration and ACB-23 development. - Conduct Step 4 At-Sea test of ACB-19. - Continue Common STDA development. - Update facilities and processes to harden the day-to-day business practices of the ACB program against cyber attacks. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase ($+0.370M) is in line with inflation associated with the RDT&E,N appropriation.					
Title: AN/SQQ-89(V) Surface Ship USW Test & Evaluation Program	0.700	0.700	0.714	0.000	0.714
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: The AN/SQQ-89(V) Surface Ship USW Test & Evaluation Program conducts testing and analysis to support certification of AN/SQQ-89A(V)15 ACBs prior to fielding. Additionally, AN/SQQ-89(V) Developmental Test (DT) and Operational Test (OT) is conducted under this program. ***FY 2019 Plans:*** - Begin conduct of ACB-15 DT events. - Begin conduct of ACB-15 OT events. - Support conduct of AIE for ACB-17 certification. Work test ship and resources in support of ACB-17 DT and ACB-17 TEMP. ***FY 2020 Base Plans:*** - Finalize a test ship and confirm resources needed in support of ACB-17 OT. - Finalize ACB-17 TEMP. - Support conduct of AIE for ACB-19 certification. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase ($+0.014M) is in line with inflation associated with the RDT&E,N appropriation.					
Title: Surface Ship Engineering Measurement Program (SSEMP)	3.200	3.078	3.140	0.000	3.140
Articles:	-	-	-	-	-
Description: Analyze the AN/SQQ-89(V) sonar system and employment in the operational setting and report results for improvement of future systems, training and employment guidance. Perform Fleet exercise data reconstruction and post-test analysis each year. Conduct selected at-sea data collection activities by providing planning support, ship riders, and analyst support. Evaluate prototype sonar employment tactics, sonar processing and automation algorithms, and communication protocols for the detection, classification, tracking, and intra-Fleet hand-off to Fleet USW assets, and provide summary reports to document results. ***FY 2019 Plans:*** - Conduct ACB-13/ACB-15 Level 4 Operator Test analysis. - Support ACB-15 IOT&E/OT data collection and analysis of operational performance.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue analysis of real-world SSEMP cases and exercise performance data. ***FY 2020 Base Plans:*** - Support ACB-15 IOT&E/OT data collection and analysis of operational performance. - Support ACB-17 IOT&E/OT data collection planning. - Continue analysis of real-world SSEMP cases/exercises performance data. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase ($+0.062M) is in line with inflation associated with the RDT&E,N appropriation.					
Title: AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade	4.200	1.352	4.157	0.000	4.157
Articles:	-	-	-	-	-
Description: Cyber security capability development to align future AN/SQQ-89A(V)15 baselines with future AEGIS integrated combat systems. ***FY 2019 Plans:*** - Continue cyber situational awareness and boundary defense capability integration efforts to align with the aggregate AEGIS Secure Combat System Architecture. - Continue efforts to improve existing software to reduce cyber security risks. - Continue development and integration of host and network security capabilities and protections into ACB, to improve system-level cyber security posture. - Support Risk Management Framework (RMF) Assessment and Authorization (A&A) activities of various ACB/TI combinations, allowing for continuous successful platform installations. ***FY 2020 Base Plans:*** - Initiate development of system architecture improvements and moving-target defense capabilities to enable cyber resiliency. - Evaluate and develop improved network and cyber monitoring through the use of advanced analytics and automation techniques. - Initiate system improvements to support Fleet network conditions and cyber response tactics. - Support implementation, testing and initial certification efforts for cyber improvements designed in FY 2019. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase ($+2.805M) is driven by: 1) the incorporation of a $-2.100M FY 2019 Congressionally directed reduction to the AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade program, and, 2) the funding of additional efforts in FY 2020 required to support implementation, testing and initial certification efforts for cyber improvements that are being designed in FY 2019.					
Accomplishments/Planned Programs Subtotals	28.410	26.321	29.572	0.000	29.572

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2136: *AN/SQQ-89 Surface ASW Combat System*	100.222	114.344	125.237	-	125.237	127.182	132.416	135.022	137.721	Continuing	Continuing
• RDTEN/0603553N/1704: *Undersea Warfare*	1.092	1.122	1.137	-	1.137	1.157	1.184	1.209	1.233	Continuing	Continuing

Remarks

D. Acquisition Strategy

- Via an ACB spiral development process, incorporate evolutionary and transformational technologies into AN/SQQ-89A(V)15 production systems.
- Utilize the Small Business Innovative Research (SBIR) program and full and open competition for new and improved innovative capability development.

E. Performance Metrics

- Deliver incremental capability increases in high interest areas, as prescribed by the Fleet and captured in campaign analysis, every two years to the AN/SQQ-89A(V)15 production program via an ACB spiral development process (ACB-15, ACB-17, etc.) by inserting maturing USW technologies.
- Conduct system qualification testing (SQT) and AEGIS Integration Events (AIE) for all fielded variants of ACB.
- Utilize the SSEMP to evaluate performance of fielded systems.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SQQ-89 S/W Development/Integration	C/CPFF	AAC : NY	6.505	0.000		0.000		0.000		-		0.000	0.000	6.505	-
SQQ-89 S/W Development/Integration	C/CPFF	Alion : IL	7.828	1.991	Nov 2017	1.275	Nov 2018	1.301	Dec 2019	-		1.301	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Adaptive Methods : VA	15.400	0.700	Feb 2018	0.811	Dec 2018	0.827	Dec 2019	-		0.827	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Applied Physical Sciences : CT	0.000	0.993	Nov 2017	1.128	Dec 2018	1.151	Dec 2019	-		1.151	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	GD-AIS : VA	11.322	0.000		0.000		0.000		-		0.000	0.000	11.322	-
SQQ-89 S/W Development/Integration	C/CPFF	In-Depth Engineering : VA	2.975	0.000		0.000		0.000		-		0.000	0.000	2.975	-
SQQ-89 S/W Development/Integration	C/CPFF	JHU/APL : MD	37.936	4.616	Feb 2018	4.804	Dec 2018	4.900	Dec 2019	-		4.900	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Metron : VA	5.450	1.000	Nov 2017	0.544	Dec 2018	0.555	Dec 2019	-		0.555	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Lockheed Martin : NY	10.205	0.000		0.000		0.000		-		0.000	0.000	10.205	-
SQQ-89 S/W Development/Integration	C/CPFF	Lockheed Martin : VA	19.713	4.505	Feb 2018	4.551	Dec 2018	6.026	Dec 2019	-		6.026	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	WR	NSWC/Carderock : MD	7.777	0.356	Jan 2018	0.000	Nov 2018	0.000		-		0.000	0.000	8.133	-
SQQ-89 S/W Development/Integration	WR	NSWC/Dahlgren : VA	1.440	0.351	Feb 2018	0.121	Dec 2018	0.123	Nov 2019	-		0.123	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	WR	NUWC/Newport : RI	16.492	0.115	Nov 2017	0.275	Nov 2018	0.281	Nov 2019	-		0.281	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Sedna Digital : VA	4.405	0.000		0.000		0.000		-		0.000	0.000	4.405	-
SQQ-89 S/W Development/Integration	C/CPFF	UT/ARL : TX	18.668	2.880	May 2018	2.869	Dec 2018	2.926	Dec 2019	-		2.926	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	VAR : VAR*	26.507	1.866	Dec 2017	3.598	Dec 2018	2.231	Dec 2019	-		2.231	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SAST Development/ Integration	C/CPFF	JHU/APL : MD	8.302	0.000		0.000		0.000		-		0.000	0.000	8.302	-
SAST Development/ Integration	WR	NSWC/Carderock : MD	13.493	0.000		0.000		0.000		-		0.000	0.000	13.493	-
SAST Development/ Integration	WR	NUWC/Newport : RI	3.080	0.000		0.000		0.000		-		0.000	0.000	3.080	-
SAST Development/ Integration	C/CPFF	Sedna Digital : VA	5.002	0.000		0.000		0.000		-		0.000	0.000	5.002	-
SAST Development/ Integration	C/CPFF	UT/ARL : TX	1.652	0.000		0.000		0.000		-		0.000	0.000	1.652	-
SAST Development/ Integration	C/CPFF	VAR : VAR*	0.812	0.000		0.000		0.000		-		0.000	0.000	0.812	-
SQQ-89 Cyber Security Development/Integration	C/CPFF	Lockheed Martin : VA	0.000	4.200	Feb 2018	1.352	Dec 2018	4.157	Dec 2019	-		4.157	Continuing	Continuing	Continuing
		Subtotal	224.964	23.573		21.328		24.478		-		24.478	Continuing	Continuing	N/A

Remarks

*Consists of multiple performing activities with funding for each not greater than $1M per year.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SSEMP ConductTest/Data Evaluation	C/CPFF	JHU/APL : MD	18.265	2.100	Feb 2018	2.025	Dec 2018	2.065	Dec 2019	-		2.065	Continuing	Continuing	Continuing
SSEMP Conduct/Test/ Data Evaluation	WR	NUWC/Newport : RI	4.412	0.500	Nov 2017	0.475	Nov 2018	0.484	Nov 2019	-		0.484	Continuing	Continuing	Continuing
SSEMP Conduct/Test/ Data Evaluation	C/CPFF	UT/ARL : TX	5.478	0.600	May 2018	0.578	Dec 2018	0.591	Dec 2019	-		0.591	Continuing	Continuing	Continuing
SQQ-89 IV&V/SAT/TEMP Assess./Update	WR	NUWC/Newport : RI	3.226	0.200	Nov 2017	0.200	Nov 2018	0.200	Nov 2019	-		0.200	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SQQ-89 DT/OT/ Miscellaneous T&E	WR	VAR : VAR*	2.985	0.500	Mar 2018	0.500	Dec 2018	0.514	Dec 2019	-		0.514	Continuing	Continuing	Continuing
		Subtotal	34.366	3.900		3.778		3.854		-		3.854	Continuing	Continuing	N/A

Remarks

*Consists of multiple performing activities with funding for each not greater than $1M per year.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPAF	BAE Systems : MD	2.999	0.000		0.000		0.000		-		0.000	0.000	2.999	-
Program Management Support	C/CPIF	CGI Federal : VA	0.500	0.877	Jan 2018	1.129	Nov 2018	1.152	Dec 2019	-		1.152	Continuing	Continuing	Continuing
Program Office Travel	Allot	NAVSEA PEO IWS5 : DC	0.914	0.060	Feb 2018	0.086	Nov 2018	0.088	Nov 2019	-		0.088	Continuing	Continuing	Continuing
		Subtotal	4.413	0.937		1.215		1.240		-		1.240	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	263.743	28.410		26.321		29.572		-		29.572	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

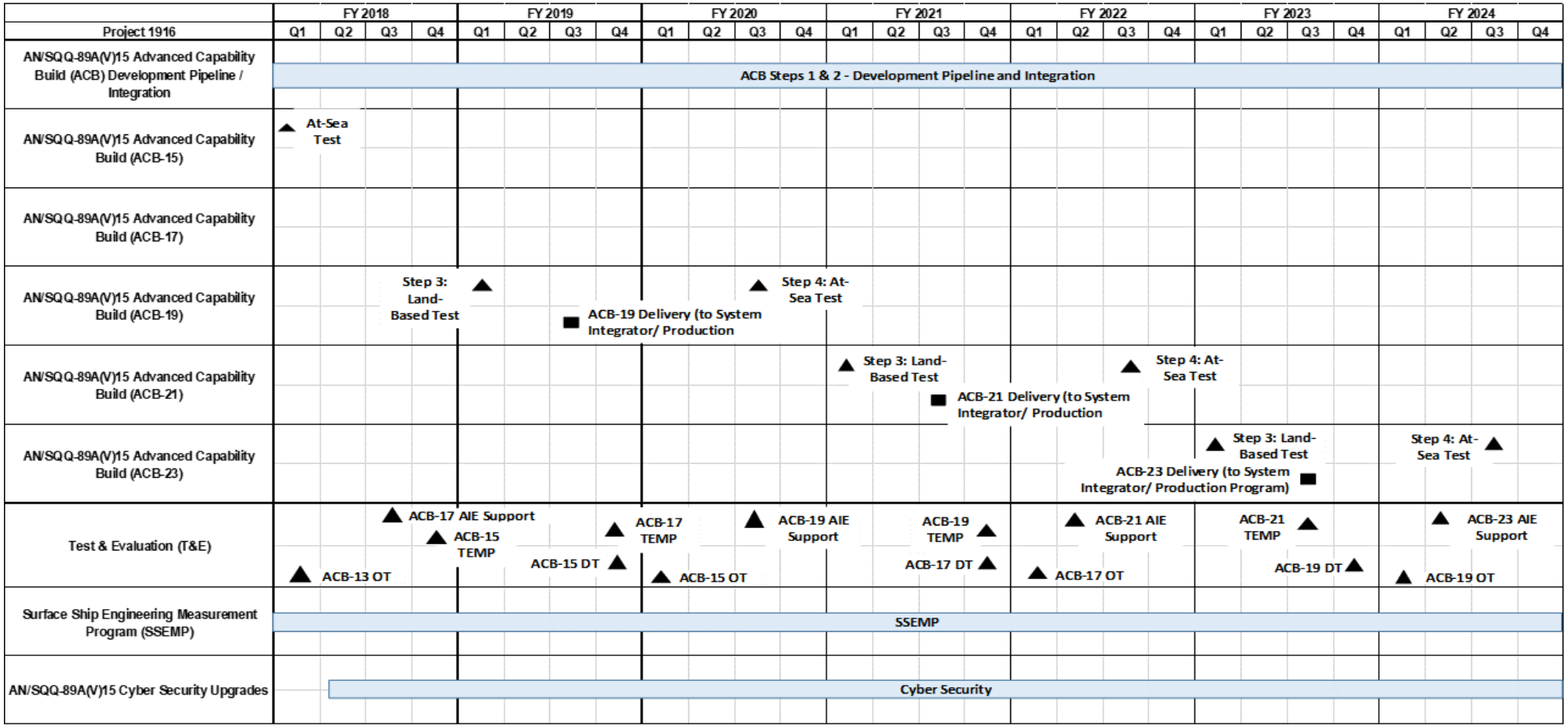


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1916				
AN/SQQ-89A(V)15 Advanced Capability Build: AN/SQQ-89A(V)15 Advanced Capability Build Development Pipleline	1	2018	4	2024
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-15): AN/SQQ-89A(V)15 ACB-15 Step 4 At-Sea Test	1	2018	1	2018
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-19): AN/SQQ-89A(V)15 ACB-19 Step 3 Land-Based Test (LBT)	1	2019	1	2019
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-19): AN/SQQ-89A(V)15 ACB-19 S/W Delivery to Integrator	3	2019	3	2019
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-19): AN/SQQ-89A(V)15 ACB-19 Step 4 At-Sea Test	3	2020	3	2020
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-21): AN/SQQ-89A(V)15 ACB-21 Step 3 Land-Based Test (LBT)	1	2021	1	2021
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-21): AN/SQQ-89A(V)15 ACB-21 S/W Delivery to Integrator	3	2021	3	2021
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-21): AN/SQQ-89A(V)15 ACB-21 Step 4 At-Sea Test	3	2022	3	2022
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-23): AN/SQQ-89A(V)15 ACB-23 Step 3 Land-Based Test (LBT)	1	2023	1	2023
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-23): AN/SQQ-89A(V)15 ACB-23 S/W Delivery to Integrator	3	2023	3	2023
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-23): AN/SQQ-89A(V)15 ACB-23 Step 4 At-Sea Test	3	2023	3	2023
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-13 Operational Test (OT)	1	2018	1	2018

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-17 AEGIS Integration Event (AIE)	3	2018	3	2018
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-15 T&E Master Plan (TEMP)	4	2018	4	2018
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-15 Developmental Test (DT)	4	2019	4	2019
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-15 Operational Test (OT)	1	2020	1	2020
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-19 AEGIS Integration Event (AIE)	3	2020	3	2020
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-17 Developmental Test (DT)	4	2021	4	2021
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-19 T&E Master Plan (TEMP)	4	2021	4	2021
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-17 Operational Test (OT)	1	2022	1	2022
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-21 AEGIS Integration Event (AIE)	2	2022	2	2022
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-21 T&E Master Plan (TEMP)	3	2023	3	2023
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-19 Developmental Test (DT)	4	2023	4	2023
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-19 Operational Test (OT)	1	2024	1	2024
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-23 AEGIS Integration Event (AIE)	2	2024	2	2024
Surface Ship Engineering Measurement Program (SSEMP): Surface Ship Engineering Measurement Program (SSEMP)	1	2018	4	2024
AN/SQQ-89A(V)15 Cyber Security Upgrades: AN/SQQ-89A(V)15 Cyber Security Upgrades	2	2018	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205632N *I MK-48 ADCAP*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	274.422	48.740	68.255	85.973	-	85.973	108.520	110.841	112.971	115.213	Continuing	Continuing
0366: *MK 48 ADCAP*	274.422	48.740	68.255	85.973	-	85.973	108.520	110.841	112.971	115.213	Continuing	Continuing

A. Mission Description and Budget Item Justification

MK-48 ADCAP (Advanced Capability) Research, Development, Test and Evaluation (RDT&E) program executes incremental development of weapon performance improvements in three development product areas: (1) Common Broadband Advanced Sonar System (CBASS), (2) Advanced Processor Builds (APBs), and (3) Torpedo Technology Insertion (TI). This Program Element (0205632N/0366) is tied to development programs that leverage a joint United States/Australia Armaments Cooperative Project (ACP) to develop MK-48 ADCAP CBASS; and Future Naval Capability (FNC) technologies developed by the Office of Naval Research (ONR).

Countermeasure (CM) sophistication and availability on the open market directly affects ADCAP kill proficiency and its ability to counter rapidly evolving threats. The focus of the MK-48 ADCAP Torpedo Research and Development (R&D) program is on hardware upgrades, rapid Commercial-Off-the-Shelf (COTS) insertion, and software APBs, in order to rapidly upgrade the ADCAP to counter evolving threats and maintain robust performance. The CBASS program developed and fielded a new sonar capable of identifying CMs and discriminating them from the target. CBASS Phase I achieved IOC in FY 2006. The Royal Australian Navy (RAN) is jointly participating to develop CBASS Phase II to improve shallow water performance and signed a Memorandum of Agreement (MOA) extension November 2009. The Memorandum Of Agreement (MOA) extension expires November 2019.

The MK-48 ADCAP Torpedo R&D program focuses on two specific areas near term; Torpedo APBs and hardware tech insertions. The CNO continues to stress shallow water as a critical operating area to counter third world diesel electric submarines. In water testing, in conjunction with laboratory simulation efforts, has shown that significant performance improvements can be made by implementing changes to weapon tactics and software algorithms. Development, implementation, and testing of these changes are being accomplished under the Torpedo APB program. The APB program also leverages the RAN joint torpedo program and FNC technologies developed by the ONR in the areas of torpedo broadband signal processing, tactics processing, and alertment. The Torpedo tech insertion program will leverage the MK-54 Lightweight torpedo algorithms.

The Torpedo Technology Insertion program will provide for evolutionary torpedo improvements and upgrades (including the transition and testing of advanced technologies from the R&D community). This approach will incorporate developmental testing of the FNC transitioning technologies for ADCAP upgrades in the areas of torpedo sensors, weapon/platform connectivity and improved fusing. These efforts will continue torpedo development investment at a lower cost and shorter term than traditional torpedo programs.

The MK 48 MOD 7 APB6/TI-1 Heavyweight Torpedo (HWT) program is an evolutionary upgrade to the MK 48 MOD 7 HWT; it will consist of an Operational Software (OPSW) upgrade referred to as APB 6 and a hardware upgrade referred to as TI-1. TI-1 will include a Guidance and Control (G&C) section upgrade, a redesigned TI-1 Warhead Electronics System (WES), and an Improved Post Launch Communications System (IPLCS). TI-1 will also include features from three Future Naval Capabilities (FNC) programs.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205632N *I MK-48 ADCAP*

APB5 software upgrades are currently in process for MK-48 ADCAP torpedoes.
APB5+ software upgrades are currently in process for MK-48 ADCAP torpedoes. APB5+ enhancements are required to address Combat Control System (CCS)/MK48 pre and post launch interface issues which limit crew full implementation of the weapon and provide numerous capability enhancements requested and endorsed by the Fleet.

Both FNC technologies and MK-54 LWT developments will be transitioned into ADCAP through APBs and technology insertion packages. Priorities for APBs and technology insertion are: (1) improved torpedo effectiveness through advanced processing algorithms, (2) advanced counter-countermeasure capability, and (3) a new array to improve torpedo effectiveness.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	68.553	94.155	87.224	-	87.224
Current President's Budget	48.740	68.255	85.973	-	85.973
Total Adjustments	-19.813	-25.900	-1.251	-	-1.251
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-25.900			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.313	0.000			
• Rate/Misc Adjustments	0.000	0.000	-1.251	-	-1.251
• Congressional Directed Reductions Adjustments	-19.500	-	-	-	-

Change Summary Explanation

FY2020: Increased budget request is due to increased funding for APB 6 software development and TI-1 Hardware development contract and Hardware support. As APB 5 completes testing, support funding shifts from APB 5 to APB 6 software support. The FY2020 decrease in Test & Evaluation funds are due to reducing the number of in-water test events for APB 5 as the program completes Operational Testing.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205632N / *MK-48 ADCAP*	Project (Number/Name) 0366 / *MK 48 ADCAP*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0366: *MK 48 ADCAP*	274.422	48.740	68.255	85.973	-	85.973	108.520	110.841	112.971	115.213	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

MK-48 ADCAP RDT&E program executes incremental development of weapon performance improvements in two development product areas: (1) APBs, and (2) Torpedo Technology Insertion. The budget enables ACAT III development to address CNO defined capability-based requirements and mission needs. This Program Element (0205632N/0366) is tied to development programs that leverage a joint United States/Australia ACP to develop MK-48 ADCAP; and FNC technologies being developed by the ONR. APB Software upgrades will improve torpedo performance in challenging water and countered environments. Hardware technology insertions will improve weapon availability through development of a G&C replacement and an Automated Test Equipment replacement.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: TORPEDO APB / TEST & EVLUATION	48.740	68.255	85.973	0.000	85.973
Articles:	-	-	-	-	-
FY 2019 Plans:					
Conduct Milestone - B Review.					
APB 6 - Continue Software development.					
APB 6 - Conduct System Functional Review (SFR).					
TI-1 - Award Hardware Development Contract.					
TI-1 - Conduct System Requirement Review (SRR).					
APB 5+ - Preliminary Design Review (PDR)					
APB 5+ - Software Build 2 (post-launch)					
APB 5 - Continue APB 5 Operational Test events (OT-C, OT-D, OT-E).					
Complete EC-WAF accreditation.					
APB5+ - Engineering test runs using EC-WAF					
FY 2020 Base Plans:					
Continue APB 6 Software development.					
Continue TI-1 Hardware development.					
Conduct TI-1 System Functional Review (SFR).					
Conduct APB 6/TI-1 Preliminary Design Review (PDR).					
APB5+ - Conduct CDR					
APB5+ - Conduct DTRR					
APB5+ - conduct OTRR					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205632N / *MK-48 ADCAP*	**Project (Number/Name)** 0366 / *MK 48 ADCAP*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
APB 5 - Complete Operational Testing (OT). APB5+ - Conduct Development Test (DT) in-water testing APB5+ - Begin Operational Testing (OT) ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of 17.718 from FY 2019 to FY 2020 is due to additional effort for APB 6 software development and TI-1 hardware development and support.					
Accomplishments/Planned Programs Subtotals	48.740	68.255	85.973	0.000	85.973

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN/3225: *MK-48 Torpedo ADCAP Mods*	38.954	40.005	39.609	-	39.609	56.785	57.964	59.062	60.234	24.519	1,562.978
• WPN/3117: *MK-48 Torpedo*	79.771	103.616	114.050	-	114.050	218.465	186.509	199.179	203.155	Continuing	Continuing

Remarks

D. Acquisition Strategy

In FY 2016, a competitive contract was awarded to procure additional warshot torpedos and continue procurement of CBASS Kits. The Program will continue to execute competitive, build to print contracts, until inventory requirements are met and all Mod 6 torpedos are converted. Throughout the contract the program will execute life of type buys to minimize the impact of obsolescence avoiding redesign and qualification during a contract cycle. The next competitive contract is planned for FY 2021 and will include fuel tank and warhead electronic sections.

Continue to incrementally develop technology to pace the threats to be integrated into the production baseline. A competitive award for TI-1 hardware development is planned for FY 2019. This hardware will be used to upgrade the entire inventory.

E. Performance Metrics

Milestone reviews.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205632N / *MK-48 ADCAP*	Project (Number/Name) 0366 / *MK 48 ADCAP*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development - APB 5 / 5+	WR	NUWC NPT : Newport RI	30.431	8.528	Oct 2017	9.057	Oct 2018	2.594	Nov 2019	-		2.594	Continuing	Continuing	Continuing
Software Development - APB 6	WR	NUWC NPT : Newport RI	7.463	10.985	Oct 2017	16.774	Oct 2018	17.799	Nov 2019	-		17.799	Continuing	Continuing	Continuing
Hardware Development - TI-1	WR	NUWC NPT : Newport RI	14.716	6.699	Oct 2017	5.798	Oct 2018	4.163	Nov 2019	-		4.163	Continuing	Continuing	Continuing
Hardware Development - TI-1	C/CPIF	TBD : TBD	0.000	0.000	Mar 2018	5.071	Mar 2019	36.253	Dec 2019	-		36.253	Continuing	Continuing	Continuing
Hardware Development - Blue Wolf	C/CPFF	NUWC NPT : Newport RI	0.000	0.000	Mar 2018	5.000	Mar 2019	5.000	Nov 2019	-		5.000	0.000	10.000	-
Hardware Development - IPLCS	TBD	OTA : TBD	0.000	0.087	Jan 2018	5.462	Oct 2018	5.462	Nov 2019	-		5.462	Continuing	Continuing	Continuing
Hardware Development - IM	WR	Indian Head : Indian Head	1.350	0.286	Jan 2018	0.450	Jan 2019	0.450	Nov 2019	-		0.450	Continuing	Continuing	Continuing
Software Development - Sprial 4 / PY Development	WR	NUWC NPT : Newport RI	31.839	0.000		0.000		0.000		-		0.000	0.000	31.839	-
		Subtotal	85.799	26.585		47.612		71.721		-		71.721	Continuing	Continuing	N/A

Remarks

Increased funding in FY20 to NUWC, Newport for APB 6 software development and for the TI-1 development Contract; reduced funding for APB 5 in FY20 as testing completes.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development - APB 5	WR	NUWC NPT : Newport RI	30.643	4.500	Oct 2017	3.130	Oct 2018	2.200	Oct 2019	-		2.200	Continuing	Continuing	Continuing
Software Development - APB 6	WR	NUWC NPT : Newport RI	0.251	1.294	Oct 2017	1.195	Oct 2018	1.652	Oct 2019	-		1.652	Continuing	Continuing	Continuing
Software Development - APB 6	WR	NUWC KPT : Keyport WA	0.899	0.723	Oct 2017	0.230	Oct 2018	0.435	Oct 2019	-		0.435	Continuing	Continuing	Continuing
Software Development / PY Development	Various	Various : Not Specified	36.317	0.000		0.000		0.000		-		0.000	0.000	36.317	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205632N / *MK-48 ADCAP*	Project (Number/Name) 0366 / *MK 48 ADCAP*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support	WR	NUWC NPT : Newport RI	2.243	0.000		0.000		0.000		-		0.000	0.000	2.243	-
Systems Engineering WCF	C/LH	NUWC NPT : Newport RI	17.750	0.000		0.000		0.000		-		0.000	0.000	17.750	-
Systems Engineering	Various	NUWC NPT : Newport RI	0.676	0.000		0.000		0.000		-		0.000	0.000	0.676	-
		Subtotal	88.779	6.517		4.555		4.287		-		4.287	Continuing	Continuing	N/A

Remarks

As APB 5 completes testing, support funding shifts from APB 5 to APB 6 software support.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation - APB 5	WR	NUWC NPT : Newport RI	15.804	6.185	Oct 2017	5.282	Oct 2018	3.370	Oct 2019	-		3.370	Continuing	Continuing	Continuing
Test & Evaluation - APB 5	WR	NUWC KPT : Keyport WA	25.795	6.212	Oct 2017	7.104	Oct 2018	4.160	Oct 2019	-		4.160	Continuing	Continuing	Continuing
Test & Evaluation - APB 5	WR	OPTEVFOR : Norfolk VA	10.365	0.830	Jun 2018	1.631	May 2019	0.515	May 2020	-		0.515	Continuing	Continuing	Continuing
Test & Evaluation - APB 6	C/CPFF	ARL / PSU : State College PA	0.298	0.575	Apr 2018	1.510	Apr 2019	1.344	Oct 2019	-		1.344	Continuing	Continuing	Continuing
Modeling & Simulation	WR	NUWC NPT : Newport RI	9.745	0.000		0.000		0.000		-		0.000	0.000	9.745	Continuing
Modeling & Simulation	C/CPFF	ARL / PSU : State College PA	14.112	0.000		0.000		0.000		-		0.000	0.000	14.112	Continuing
Test & Evaluation - Spiral 4 / PY	WR	NUWC NPT : Newport RI	17.086	1.290	Jun 2018	0.000		0.000		-		0.000	0.000	18.376	-
		Subtotal	93.205	15.092		15.527		9.389		-		9.389	Continuing	Continuing	N/A

Remarks

Decrease in T&E funds due to reduced number of in-water test events for APB 5.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205632N / *MK-48 ADCAP*	Project (Number/Name) 0366 / *MK 48 ADCAP*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/CPFF	Alion Science : Mclean VA	5.340	0.496	Nov 2017	0.511	Dec 2018	0.526	Dec 2019	-		0.526	0.000	6.873	-
Travel	WR	NAVSEA : Washington DC	1.299	0.050	Nov 2017	0.050	Dec 2018	0.050	Dec 2019	-		0.050	0.000	1.449	-
		Subtotal	6.639	0.546		0.561		0.576		-		0.576	0.000	8.322	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	274.422	48.740		68.255		85.973		-		85.973	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205632N / *MK-48 ADCAP*	**Project (Number/Name)** 0366 / *MK 48 ADCAP*

MK 48 MOD 7 APB5 Acquisition Schedule

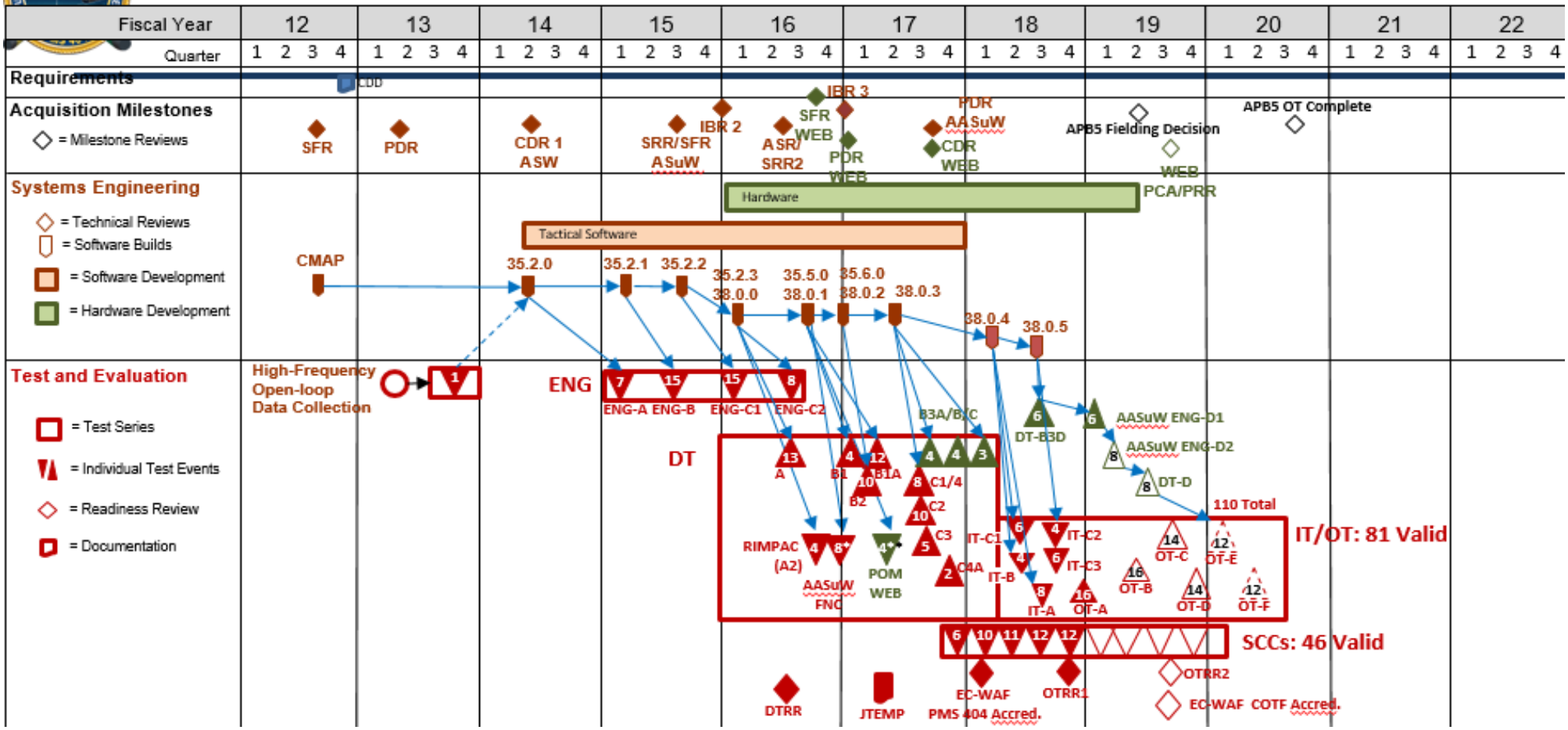


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205632N / *MK-48 ADCAP*	**Project (Number/Name)** 0366 / *MK 48 ADCAP*

MK 48 APB6/TI-1 Acquisition Schedule

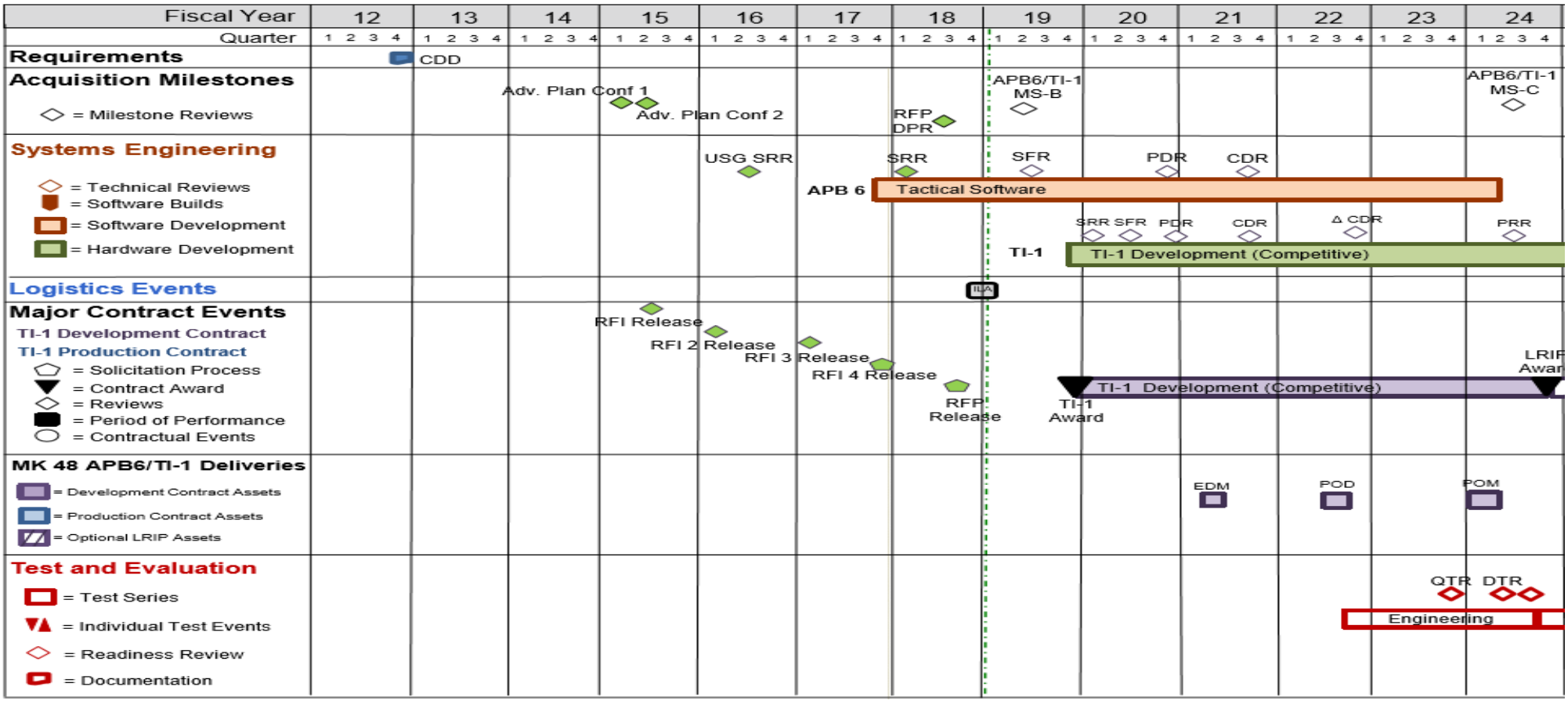


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205632N / *MK-48 ADCAP*	**Project (Number/Name)** 0366 / *MK 48 ADCAP*

MK 48 MOD 7 APB5+ Acquisition Schedule

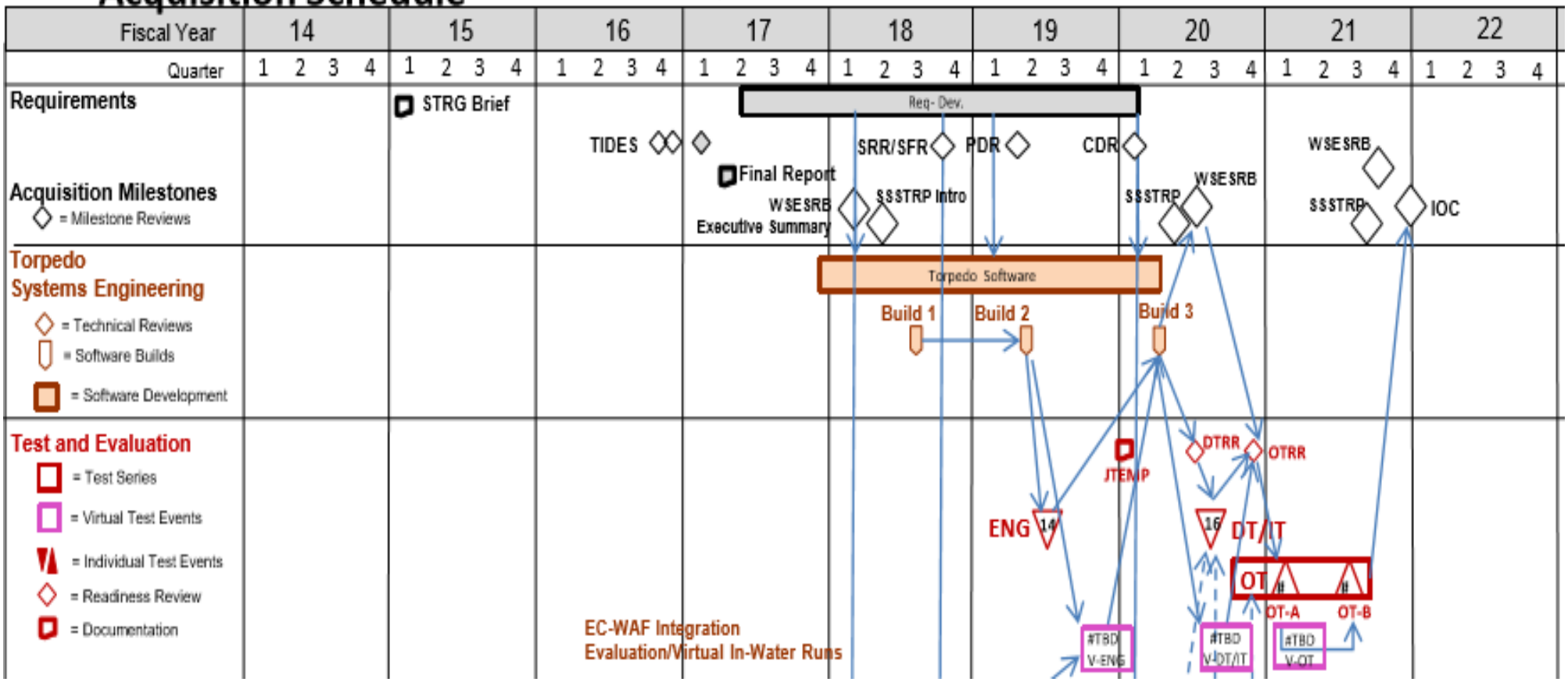


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205632N / *MK-48 ADCAP*	**Project (Number/Name)** 0366 / *MK 48 ADCAP*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0366				
APB 5 Development: Continue APB 5 Developmental Test (DT)	1	2018	2	2018
APB 5 Development: APB 5 Operation Test (IT/OT)	2	2018	3	2020
APB 5 Development: APB 5 IOC	4	2021	4	2021
APB 6 Software / TI-1 Hardware Development: APB 6 Development	1	2018	2	2024
APB 6 Software / TI-1 Hardware Development: TI-1 Development	4	2019	4	2024
APB 6 Software / TI-1 Hardware Development: APB 6/TI-1 Developmental Test (DT)	3	2023	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205633N *I Aviation Improvements*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	1,460.130	120.940	134.823	125.461	-	125.461	139.748	131.031	124.054	126.529	Continuing	Continuing
0601: *Acft Handling & Service Equip*	34.105	2.717	4.868	6.711	-	6.711	3.063	2.721	4.775	4.869	Continuing	Continuing
0852: *Consolidated Auto Support System*	167.697	6.465	4.752	13.858	-	13.858	19.962	13.932	6.870	7.009	Continuing	Continuing
1041: *Acft Equip Repl/Maint Prog*	58.222	3.263	3.369	3.452	-	3.452	3.484	3.555	3.624	3.698	Continuing	Continuing
1355: *Propulsion and Power Component Improvement Program*	1,143.526	91.528	105.223	99.372	-	99.372	112.398	110.823	108.785	110.953	Continuing	Continuing
2269: *Expeditionary Airfield Improvements*	56.580	12.139	1.611	2.068	-	2.068	0.841	0.000	0.000	0.000	0.000	73.239
9999: *Congressional Adds*	0.000	4.828	15.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.828

A. Mission Description and Budget Item Justification

Project 0601 - Common Ground Equipment is a Naval Aviation Project to apply new technology to common support equipment necessary to support multiple aircraft.

Project 0852: Consolidated Automated Support System is a standardized Automated Test Equipment with computer assisted, multi-function capabilities to support the maintenance of aircraft weapons systems and missiles.

Project 1041 - Aircraft Equipment Reliability/Maintainability Improvement Program is the only Navy program that provides engineering support for in-service out-of-production aircraft equipment, and provides increased readiness at reduced operational and support cost.

Project 1355 - Aircraft Engine Component Improvement Program develops reliability and maintainability and safety enhancements for in-service Navy aircraft engines, transmissions, propellers, starters, auxiliary power units, electrical generating systems, fuel systems, fuels, and lubricants.

Project 2269 - The Expeditionary Airfields (EAF) program designs, develops, tests and fields a sustainment lighting system to replace existing obsolete legacy EAF lighting system.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205633N *I Aviation Improvements*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	119.099	121.805	127.327	-	127.327
Current President's Budget	120.940	134.823	125.461	-	125.461
Total Adjustments	1.841	13.018	-1.866	-	-1.866
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.982			
• Congressional Rescissions	-	-			
• Congressional Adds	-	15.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.158	0.000			
• Program Adjustments	0.000	0.000	-1.640	-	-1.640
• Rate/Misc Adjustments	-0.001	0.000	-0.226	-	-0.226
• Congressional Add Adjustments	5.000	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *Program Increase*	4.828	0.000
Congressional Add: *F/A-18 E/F and E/A-18G Engine Enhancements*	0.000	15.000
Congressional Add Subtotals for Project: 9999	4.828	15.000
Congressional Add Totals for all Projects	4.828	15.000

Change Summary Explanation

The FY 2020 funding request was reduced by $9.000 million to account for the availability of prior year execution balances.

FY 2020 increase to standup Fourth Generation Electro-Optic (EO4) program and award the development contract.

Schedule:

Project 0852: The Fourth Generation Electro-Optic (EO4) development program will design, develop, integrate, and test a modernized electro-optic system to replace the legacy Third Generation Electro-Optic (EO3) systems which are experiencing untenable obsolescence issues. The continuation of this repair capability at both shore-based and afloat sites is critical to sustain maintenance and repair capabilities for the F/A-18 Advanced Targeting Forward Looking

Infrared (ATFLIR) and the H-60 Multi-Spectral Targeting (MTS) weapon systems. EO4 funds support development of tester to replace legacy EO3. Program schedule added to budget.

The Test Technology development project includes continued development of technical solutions to meet emerging weapons system testing requirements and to resolve other imminent obsolescence issues. Emerging capability requirements include advanced inertial device, expanded high-speed bus, virtual instrument, cybersecurity, and other technology advancements required to address capability requirements.

Project 2269: Due to system maturity design concerns with the Lead Systems Integrator (LSI), the Sustainment Lighting System (SLS) program was re-scoped to focus on the development of a new Light Emitting Diode (LED) CAT I Instrumented Flight Rules (IFR)/Visual Flight Rules (VFR) Approach Light System and the schedule has been updated accordingly. The following are changes to the schedule as a result: Added Systems Engineering Support from 1QFY 2018 to 2Q FY 2021; Hardware/Software System Design and Development end date moved from 1Q FY 2019 to 3Q FY 2019; Critical Design Review (CDR) moved from 4Q FY 2017 to 2Q FY 2019; Test Readiness Review (TRR) moved from 1Q FY 2018 to 3Q FY 2019; Developmental Test & Evaluation (DT&E) start date moved from 1Q FY 2018 to 3Q FY 2019 and the end date moved from 3Q FY 2018 to 4Q 2019; Combined Integration Test and Operational Test was moved from 1Q FY 2019 to 4Q FY 2019; Production Readiness Review (PRR) was added to 2Q FY 2020; Milestone C moved from 4Q FY 2019 to 3Q FY 2020; Full Rate Production decision moved from 2Q FY 2020 to 1Q FY 2021; IOC moved from 2Q FY 2020 to1Q FY2021.

Technical: Not Applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 0601 / *Acft Handling & Service Equip*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0601: *Acft Handling & Service Equip*	34.105	2.717	4.868	6.711	-	6.711	3.063	2.721	4.775	4.869	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Common Ground Equipment is a Naval Aviation project to apply new technology to common support equipment necessary to support multiple systems/aircraft within the Navy. The common support equipment items developed with this budget are briefed to the Air Force, Army and Coast Guard for possible use in joint procurement in the production phase.

Crash cranes are used for lifting and moving disabled aircraft on CVN and L-Class ship flight decks. The Carrier/Amphibious Assault Ship Crash Crane (CV/AACC) will be a diesel powered lift system performing crash and salvage functions on board CVN and L-class ships. The CV/AACC will replace the legacy A/S32A-35A, Carrier Vessel Crash Crane (CVCC) and the A/S32A-36A Amphibious Assault Crash Crane (AACC). The CV/AACC will support all aircraft on CVN and L-Class ships.

Funding supports the evaluation, testing and integration to develop Portable Electronic Maintenance Aids (PEMA) Commercial Off the Shelf solution for portable device deployments across the Naval Aviation Enterprise. PEMA is a portable device utilized by maintainers with the implementation of digital maintenance capabilities (digital publications, Interactive Electronic Technical Manuals, Internet Protocol based data uploads, Binary digit data downloads, automated diagnostics, and planeside Naval Aviation Logistics Command/Management Information System. PEMAs are a mandatory display device supporting modern day Automated Maintenance Environment implemented for weapon systems.

Future Readiness Initiative to Develop Standard PEMA Cyber Solution (SPECS) architecture for all Portable Electronic Maintenance Aids (PEMA)s to standardize software across NAE, leverage existing enterprise tools, and to correct cyber shortfalls identified by the Cyber Warfare Detachment (CWD). A Cyber Risk Assessment (CRA) identified vulnerabilities on the Portable Electronic Maintenance Aid (PEMA) system that could be exploited to threaten U.S. capabilities. A new software image and configuration management process has been identified to mitigate the top 60% of identified risk groups and 100% of penetration test findings from the CRA. The Abbreviated Acquisition Program (AAP) will be executed as a software Engineering Change Proposal (ECP) to the PEMA POR using a Model 3: Incrementally Deployed Software Intensive Program / Agile method.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Turbo Shaft Engine Dynamometer Technology Development	0.570	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Develop, integrate, and evolve dynamometer technologies and capabilities for insertion into testing of turbo shaft engines. Current V35 dynamometer used to test T700 engines at the intermediate maintenance level has obsolescence issues and worn components that have been overhauled three times since initial fielding					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
in the 1980s. The OEM has stated that it does not recommend a fourth overhaul due to structural issues. Insertion of new dynamometer technologies is required to test next generation T700 engines with increased torque and horsepower and to retire legacy units which have tired metal due to cycle fatigue. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Borescope Technology Development ***Articles:*** ***Description:*** Develop, integrate, and evolve borescope technologies to meet emergent jet engine inspection requirements. Current fielded engine borescopes are unable to measure required defects on aircraft turbine engine compressor blades to the accuracy required. Additionally, current legacy borescopes will not be supported by the original equipment manufacturer beyond FY22. Legacy borescopes are susceptible to damage due to the insertion tube not being detachable/removable. A detachable insertion tube would increase system availability and reduce repair costs. New borescope technology is needed to improve defect measurement accuracy and equipment supportability. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	0.483 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: Standard PEMA Cyber Solution (SPECS) ***Articles:*** ***Description:*** Capability/Program Description: The Portable Electronic Maintenance Aid (PEMA) Cyber Risk Assessment (CRA) has identified cyber vulnerabilities that could be exploited to threaten US fighting forces. Implementation of mandatory Cyber Security (CS) requirements would decrease the CS attack surface. Develop	0.000 -	1.974 -	2.000 -	0.000 -	2.000 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Standard PEMA Cyber Solution (SPECS) architecture for all PEMAs to standardize software across NAE, leverage existing enterprise tools, and to correct cyber shortfalls identified by the Cyber Warfare Detachment (CWD) Cyber Risk Assessment (CRA). Implement CS enhancements to reduce risk from cyber-attack. ***FY 2019 Plans:*** Develop Standard PEMA Cyber Solution (SPECS) core software solution enhancements to correct cyber shortfalls, develop/enhance Enterprise products (CMDS, PREP, and CFE) for software standardization across NAE, and develop/integrate T/M/S unique applications to be hosted on a common image. ***FY 2020 Base Plans:*** Develop Standard PEMA Cyber Solution (SPECS) core software solution enhancements to correct cyber shortfalls, develop/enhance Enterprise products (CMDS, PREP, and CFE) for software standardization across NAE, and develop/integrate T/M/S unique applications to be hosted on a common image. Production delivery for group 1 SPECS to the fleet. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Title: Carrier/Amphibious Assault Ship Crash Crane (CV/AACC) ***Articles:***	0.964 -	2.194 -	4.011 2	0.000 -	4.011 2
Description: Name change from Carrier Crash Crane (CV) to Carrier/Amphibious Assault Ship Crash Crane (CV/AACC) due to adding the amphibious assault ship back to the procurement. CV are required to remove damaged aircraft from the flight deck. In 2004, a solicitation for a commerical off the shelf replacement for the existing shipboard crash crane was issued. Two bids were received, and after a complete evaluation with many rounds of discussions with the companies bidding, both proposals were found to be technically inadequate and the procurement effort was discontinued. As a result, the crash cranes have continued operation unchanged. Designed in the late 1980's, major systems are beginning to experience the obsolescence of spare parts and are in need of updating. R&D resources are needed to identify not only replacements, but new technologies, which can increase the reliability and maintainability of this flight ops critical piece of equipment. Systems updates would include the engine/generator and electrical updates to the motor drive/control system. An exploration of power sources other than diesel engines would be considered and a corrosion resistant boom. ***FY 2019 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Conduct Milestone B and award contract. ***FY 2020 Base Plans:*** Manufacture 2 Nuclear Powered Aircraft Carrier (CVN) Prototype Cranes and begin contractor testing. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2020 funds the increase in scope due to better defined system requirements. FY 2020 funds the manufacturing of two CVN prototype cranes and testing.					
Title: Portable Electronic Maintenance Aid (PEMA) ***Articles:*** ***Description:*** Portable Electronic Maintenance Aid (PEMA) funding supports the evaluation, testing and integration to develop PEMA Commercial Off-the-Shelf (COTS) solution for portable device deployments across the Naval Aviation Enterprise. PEMA is a portable device utilized by maintainers with the implementation of digital maintenance capabilities (digital publications, Interactive Electronic Technical Manuals, Internet Protocol based data uploads, Binary digit data downloads, automated diagnostics, and planeside Naval Aviation Logistic Command Management Information System. PEMAs are a mandatory display device supporting modern day Automated Maintenance Environment implemented for weapon systems. ***FY 2019 Plans:*** Evaluate, test and integrate evolving COTS solutions. Conduct test & evaluation of T/M/S peculiar software/ hardware requirements and network connectivity compliance across the GIG prior to deployment to the fleet by a yearly release cycle. ***FY 2020 Base Plans:*** Evaluate, test and integrate evolving COTS solutions. Conduct test & evaluation of T/M/S peculiar software/ hardware requirements and network connectivity compliance across the GIG prior to deployment to the fleet by a yearly release cycle. ***FY 2020 OCO Plans:*** N/A	0.700 -	0.700 -	0.700 -	0.000 -	0.700 -
Accomplishments/Planned Programs Subtotals	2.717	4.868	6.711	0.000	6.711

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0705: *Ground Support Equipment - CSE/ICP*	84.816	111.163	82.464	-	82.464	84.887	86.216	88.747	91.017	Continuing	Continuing
• OPN/4268: *Aviation Support Equipment - PEMA*	12.909	11.885	10.988	-	10.988	11.873	11.146	11.379	11.607	Continuing	Continuing

Remarks

D. Acquisition Strategy

Common Ground Equipment: This is a non ACAT program. Field activities propose tentative projects. Internal panel merits and selects projects. Field activities develop projects and submit results. Operational Advisory Group process selects projects to transition to procurement.

Carrier/Amphibious Assault Ship Crash Crane (CV/AACC): Market research results indicate that six (6) companies have the potential to develop (modified COTS) and manufacture crash cranes that meet the specification requirements, inclusive of the lift requirements and unique shipboard environmental requirements including shock, vibration, Electromagnetic Interference (EMI) and ship motion characteristics. The program will enter the acquisition process at Milestone B (MS-B). The contracting strategy consists of awarding a best value, competitive, Firm Fixed Price (FFP) Indefinite Delivery, Indefinite Quantity (IDIQ) contract.

The selected contractor will design, develop, manufacture, test, and deliver two (2) CCSCs and one (1) ACSC Engineering Development Model (EDM), along with all required technical data and logistics documentation. Following MS C approval, one (1) CCSC and one (1) ACSC LRIP will be procured to support DT-C1 testing and production. Following FRPDR approval, 25 additional production units consisting of 13 CCSCs and 12 ACSCs will be procured using priced delivery orders which will meet the total fleet inventory of 27 units.

Portable Electronic Maintenance Aids: The management approach includes the Program Management Office residing at NAVAIR with Milestone Decision Authority delegated to the Naval Air Systems Command Chief Information Officer. The evolutionary development approach will be used to execute requirements. Contracting for the prime integrator will be via competitively awarded Indefinite Delivery/Indefinite Quantity contracts.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 0601 / *Acft Handling & Service Equip*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hdw Dev - CV	C/FFP	TBD : TBD	0.000	0.000		1.380	Jan 2019	2.407	Jan 2020	-		2.407	0.000	3.787	3.787
Systems Engineering - CV	WR	NAWCAD : LAKEHURST, NJ	3.164	0.964	Nov 2017	0.814	Nov 2018	0.847	Nov 2019	-		0.847	Continuing	Continuing	Continuing
Systems Engineering - Dynamometer	WR	NAWCAD : LAKEHURST, NJ	0.000	0.570	Nov 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering - Borescope	WR	NAWCAD : LAKEHURST	0.000	0.483	Nov 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering - SPECS	C/IDIQ	TBD : TBD	0.000	0.000		1.383	Dec 2018	1.400	Dec 2019	-		1.400	0.000	2.783	2.783
Prior year Prod Dev cost no longer funded in the FYDP	Various	Various : Various	18.639	0.000		0.000		0.000		-		0.000	0.000	18.639	-
		Subtotal	21.803	2.017		3.577		4.654		-		4.654	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior year Support cost no longer funded in the FYDP	Various	Various : Various	8.857	0.000		0.000		0.000		-		0.000	0.000	8.857	-
		Subtotal	8.857	0.000		0.000		0.000		-		0.000	0.000	8.857	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Operational T & E - PEMA	WR	NAWCAD : PAX RIVER, MD	1.133	0.425	Nov 2017	0.425	Nov 2018	0.425	Nov 2019	-		0.425	Continuing	Continuing	Continuing
Operational T & E - PEMA	WR	FRC SE : Jacksonville, FL	1.076	0.275	Nov 2017	0.275	Nov 2018	0.275	Nov 2019	-		0.275	0.000	1.901	-
C&G Test - CV	WR	NAWCAD : PAX RIVER, MD	0.317	0.000		0.000		0.757	Nov 2019	-		0.757	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 0601 / *Acft Handling & Service Equip*	

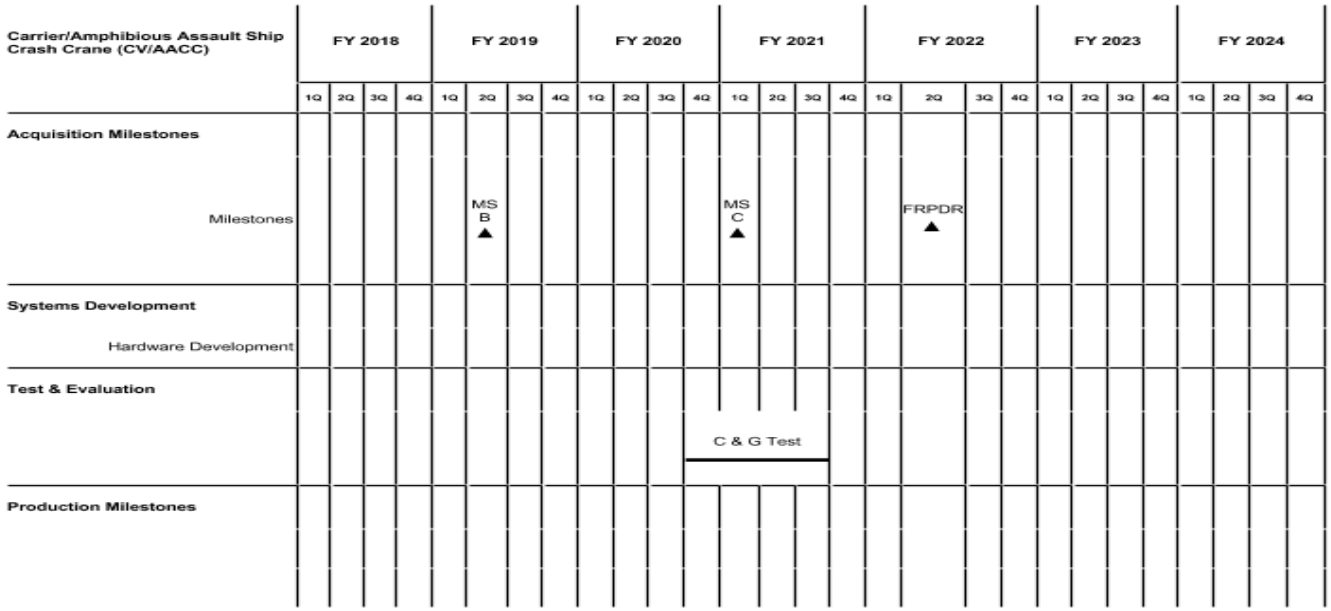
Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Operational T & E - SPECS	WR	FRC SE : Jacksonville, FL	0.000	0.000		0.591	Dec 2018	0.600	Dec 2019	-		0.600	0.000	1.191	-
Prior year T&E cost no longer funded in the FYDP	Various	Various : Various	0.919	0.000		0.000		0.000		-		0.000	0.000	0.919	-
		Subtotal	3.445	0.700		1.291		2.057		-		2.057	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	34.105	2.717		4.868		6.711		-		6.711	Continuing	Continuing	N/A

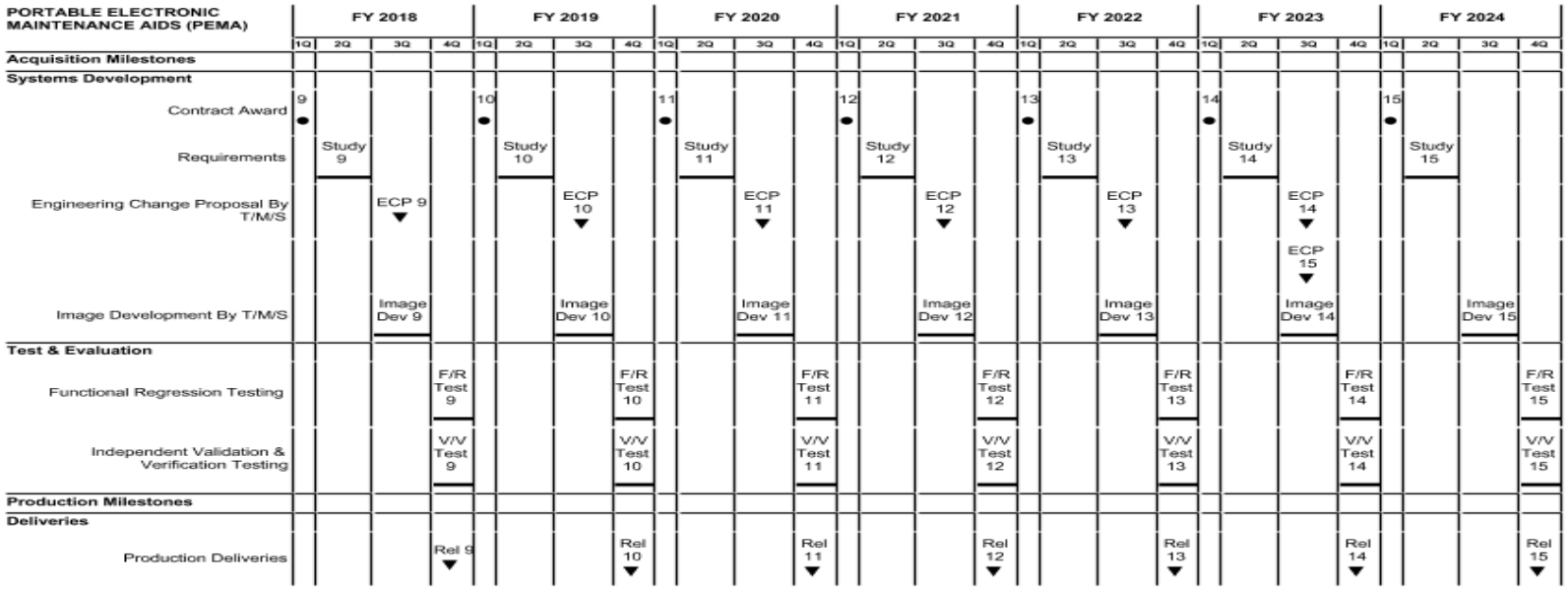
Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*



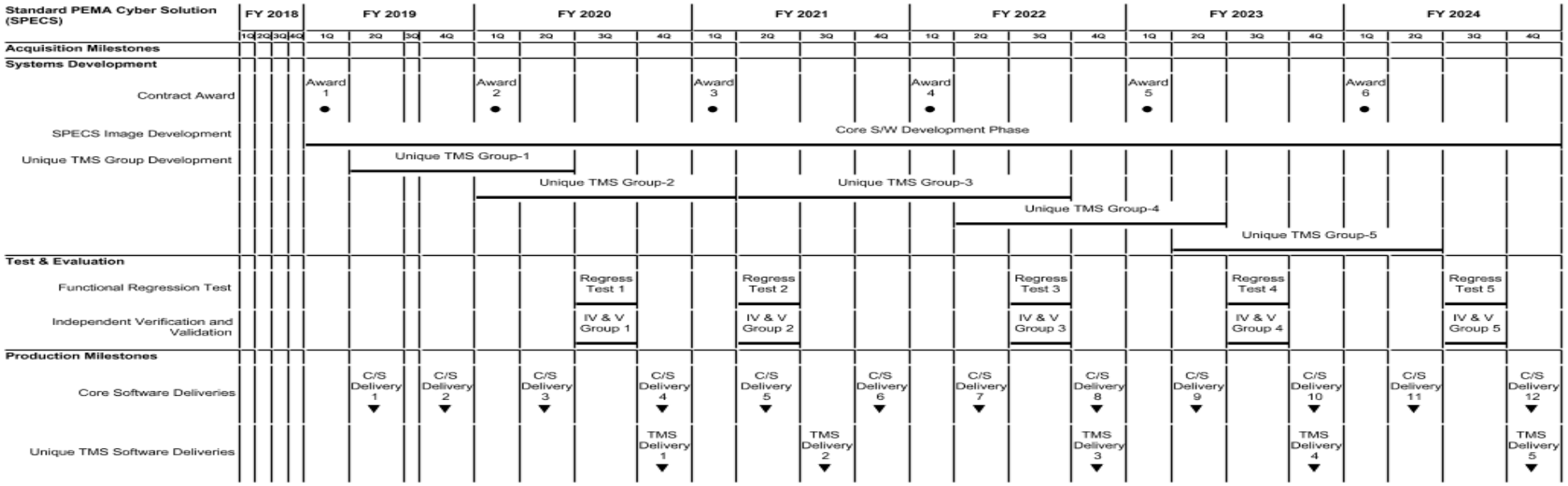
2020DON - 0205633N - 0601

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*



2020DON - 0205633N - 0601

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*



2020DON - 0205633N - 0601

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Carrier/Amphibious Assault Ship Crash Crane (CV/AACC)				
Acquisition Milestones: Milestones: MILESTONE B	2	2019	2	2019
Acquisition Milestones: Milestones: MILESTONE C	1	2021	1	2021
Acquisition Milestones: Milestones: FRPDR	2	2022	2	2022
Test & Evaluation: CV - CONTRACTOR AND GOVT RUN TESTING	4	2020	3	2021
PORTABLE ELECTRONIC MAINTENANCE AIDS (PEMA)				
Systems Development: Contract Award: Contract Award 9	1	2018	1	2018
Systems Development: Contract Award: Contract Award 10	1	2019	1	2019
Systems Development: Contract Award: Contract Award 11	1	2020	1	2020
Systems Development: Contract Award: Contract Award 12	1	2021	1	2021
Systems Development: Contract Award: Contract Award 13	1	2022	1	2022
Systems Development: Contract Award: Contract Award 14	1	2023	1	2023
Systems Development: Contract Award: Contract Award 15	1	2024	1	2024
Systems Development: Requirements: Requirements Study Complete 9	2	2018	2	2018
Systems Development: Requirements: Requirements Study Complete 10	2	2019	2	2019
Systems Development: Requirements: Requirements Study Complete 11	2	2020	2	2020
Systems Development: Requirements: Requirements Study Complete 12	2	2021	2	2021
Systems Development: Requirements: Requirements Study Complete 13	2	2022	2	2022
Systems Development: Requirements: Requirements Study Complete 14	2	2023	2	2023
Systems Development: Requirements: Requirements Study Complete 15	2	2024	2	2024
Systems Development: Engineering Change Proposal By T/M/S: Engineering Change Proposal By T/M/S, ECP 9	3	2018	3	2018

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Systems Development: Engineering Change Proposal By T/M/S: Engineering Change Proposal By T/M/S, ECP 10	3	2019	3	2019
Systems Development: Engineering Change Proposal By T/M/S: Engineering Change Proposal By T/M/S, ECP 11	3	2020	3	2020
Systems Development: Engineering Change Proposal By T/M/S: Engineering Change Proposal By T/M/S, ECP 12	3	2021	3	2021
Systems Development: Engineering Change Proposal By T/M/S: Engineering Change Proposal By T/M/S, ECP 13	3	2022	3	2022
Systems Development: Engineering Change Proposal By T/M/S: Engineering Change Proposal By T/M/S, ECP 14	3	2023	3	2023
Systems Development: Engineering Change Proposal By T/M/S: Engineering Change Proposal By T/M/S, ECP 15	3	2023	3	2023
Systems Development: Image Development By T/M/S: Image Development By T/M/S 9	3	2018	3	2018
Systems Development: Image Development By T/M/S: Image Development By T/M/S 10	3	2019	3	2019
Systems Development: Image Development By T/M/S: Image Development By T/M/S 11	3	2020	3	2020
Systems Development: Image Development By T/M/S: Image Development By T/M/S 12	3	2021	3	2021
Systems Development: Image Development By T/M/S: Image Development By T/M/S 13	3	2022	3	2022
Systems Development: Image Development By T/M/S: Image Development By T/M/S 14	3	2023	3	2023
Systems Development: Image Development By T/M/S: Image Development By T/M/S 15	3	2024	3	2024
Test & Evaluation: Functional Regression Testing: Functional/Regression Testing 9	4	2018	4	2018
Test & Evaluation: Functional Regression Testing: Functional/Regression Testing 10	4	2019	4	2019
Test & Evaluation: Functional Regression Testing: Functional/Regression Testing 11	4	2020	4	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Test & Evaluation: Functional Regression Testing: Functional/Regression Testing 12	4	2021	4	2021
Test & Evaluation: Functional Regression Testing: Functional/Regression Testing 13	4	2022	4	2022
Test & Evaluation: Functional Regression Testing: Functional/Regression Testing 14	4	2023	4	2023
Test & Evaluation: Functional Regression Testing: Functional/Regression Testing 15	4	2024	4	2024
Test & Evaluation: Independent Validation & Verification Testing: Independent Validation & Verification Testing 9	4	2018	4	2018
Test & Evaluation: Independent Validation & Verification Testing: Independent Validation & Verification Testing 10	4	2019	4	2019
Test & Evaluation: Independent Validation & Verification Testing: Independent Validation & Verification Testing 11	4	2020	4	2020
Test & Evaluation: Independent Validation & Verification Testing: Independent Validation & Verification Testing 12	4	2021	4	2021
Test & Evaluation: Independent Validation & Verification Testing: Independent Validation & Verification Testing 13	4	2022	4	2022
Test & Evaluation: Independent Validation & Verification Testing: Independent Validation & Verification Testing 14	4	2023	4	2023
Test & Evaluation: Independent Validation & Verification Testing: Independent Validation & Verification Testing 15	4	2024	4	2024
Deliveries: Production Deliveries: Production Delivery, Release 9	4	2018	4	2018
Deliveries: Production Deliveries: Production Delivery, Release 10	4	2019	4	2019
Deliveries: Production Deliveries: Production Delivery, Release 11	4	2020	4	2020
Deliveries: Production Deliveries: Production Delivery, Release 12	4	2021	4	2021
Deliveries: Production Deliveries: Production Delivery, Release 13	4	2022	4	2022
Deliveries: Production Deliveries: Production Delivery, Release 14	4	2023	4	2023
Deliveries: Production Deliveries: Production Delivery, Release 15	4	2024	4	2024
Standard PEMA Cyber Solution (SPECS)				
Systems Development: Contract Award: Contract Award 1	1	2019	1	2019
Systems Development: Contract Award: Contract Award 2	1	2020	1	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Systems Development: Contract Award: Contract Award 3	1	2021	1	2021
Systems Development: Contract Award: Contract Award 4	1	2022	1	2022
Systems Development: Contract Award: Contract Award 5	1	2023	1	2023
Systems Development: Contract Award: Contract Award 6	1	2024	1	2024
Systems Development: SPECS Image Development: SPECS Image	1	2019	4	2024
Systems Development: Unique TMS Group Development: Unique TMS Group-1	2	2019	2	2020
Systems Development: Unique TMS Group Development: Unique TMS Group-2	1	2020	1	2021
Systems Development: Unique TMS Group Development: Unique TMS Group-3	2	2021	3	2022
Systems Development: Unique TMS Group Development: Unique TMS Group-4	2	2022	2	2023
Systems Development: Unique TMS Group Development: Unique TMS Group-5	2	2023	2	2024
Test & Evaluation: Functional Regression Test: Group 1	3	2020	3	2020
Test & Evaluation: Functional Regression Test: Group 2	2	2021	2	2021
Test & Evaluation: Functional Regression Test: Group 3	3	2022	3	2022
Test & Evaluation: Functional Regression Test: Group 4	3	2023	3	2023
Test & Evaluation: Functional Regression Test: Group 5	3	2024	3	2024
Test & Evaluation: Independent Verification and Validation: Group 1	3	2020	3	2020
Test & Evaluation: Independent Verification and Validation: Group 2	2	2021	2	2021
Test & Evaluation: Independent Verification and Validation: Group 3	3	2022	3	2022
Test & Evaluation: Independent Verification and Validation: Group 4	3	2023	3	2023
Test & Evaluation: Independent Verification and Validation: Group 5	3	2024	3	2024
Production Milestones: Core Software Deliveries: Deliveries 1	2	2019	2	2019
Production Milestones: Core Software Deliveries: Deliveries 2	4	2019	4	2019
Production Milestones: Core Software Deliveries: Deliveries 3	2	2020	2	2020
Production Milestones: Core Software Deliveries: Deliveries 4	4	2020	4	2020
Production Milestones: Core Software Deliveries: Deliveries 5	2	2021	2	2021
Production Milestones: Core Software Deliveries: Deliveries 6	4	2021	4	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0601 / *Acft Handling & Service Equip*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: Core Software Deliveries: Deliveries 7	2	2022	2	2022
Production Milestones: Core Software Deliveries: Deliveries 8	4	2022	4	2022
Production Milestones: Core Software Deliveries: Deliveries 9	2	2023	2	2023
Production Milestones: Core Software Deliveries: Deliveries 10	4	2023	4	2023
Production Milestones: Core Software Deliveries: Deliveries 11	2	2024	2	2024
Production Milestones: Core Software Deliveries: Deliveries 12	4	2024	4	2024
Production Milestones: Unique TMS Software Deliveries: Deliveries 1	4	2020	4	2020
Production Milestones: Unique TMS Software Deliveries: Deliveries 2	3	2021	3	2021
Production Milestones: Unique TMS Software Deliveries: Deliveries 3	4	2022	4	2022
Production Milestones: Unique TMS Software Deliveries: Deliveries 4	4	2023	4	2023
Production Milestones: Unique TMS Software Deliveries: Deliveries 5	4	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*				Project (Number/Name) 0852 / *Consolidated Auto Support System*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
0852: *Consolidated Auto Support System*	167.697	6.465	4.752	13.858	-	13.858	19.962	13.932	6.870	7.009	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The electronic Consolidated Automated Support System (eCASS) project is the system design and development of the latest generation of the US Navy's CASS family of automatic test systems. The legacy CASS system was designed and developed in the 1980's and commenced fielding in 1992. As such, it is reaching the end of its useful life due to obsolescence issues. eCASS is the replacement system for legacy CASS systems, which provides Naval aircraft avionics component maintenance and repair support at Intermediate and Depot maintenance facilities both shore-based and afloat. As a CASS replacement program, the eCASS program objectives remain the same as that of CASS. Specifically: (1) increase material readiness; (2) reduce life cycle costs; (3) improve tester sustainability at depot and intermediate maintenance levels; (4) reduce proliferation of unique test equipment, and (5) provide test capability for existing and emerging avionics/electronics aircraft weapon systems.

The Test Technology development project includes analysis, application, maturation, integration and testing of emerging electronic, mechanical, and optical test technologies for potential military utility for emerging requirements or obsolescence resolution in support of Naval avionics testing and repair. Specifically included are next-generation electro-optics, synthetic instruments, high-speed bus technologies, inertial device technologies, and various other elements of modernization for the Consolidated Automated Support System (CASS) family of automated test equipment, including associated Test Program Sets (TPSs) and ancillary equipment.

The Third Generation Electro-Optical (EO3) Technology Development project consists of the design and development of technology solutions, including a near-infrared camera solution to replace the existing obsolete EO3 console camera, for use in 65 fielded Navy test systems at both shore-based and afloat sites. The EO3 console subsystem is hosted by the US Navy Consolidated Automated Support System (CASS/eCASS) family of automatic test systems and is used to test, diagnose and repair the H-60 Multi-spectral Targeting System (MTS) and F/A-18 Advanced Targeting Forward Looking Infrared (ATFLIR) weapon systems. The objective of the EO3 Technology Development project is to extend the useful life of fielded EO3 systems in order to sustain H-60 MTS and F/A-18 ATFLIR weapon system readiness until a next-generation EO replacement system can be designed, developed, produced, and fielded.

The Fourth Generation Electro-Optical (EO4) development project consists of the design and development of the latest generation electro-optic test console for use with the electronic CASS (eCASS) automatic test system. The EO4 system will replace the legacy Third Generation Electro-Optical (EO3) system, which is facing imminent obsolescence, in providing test, repair, and maintenance capability for Naval and Marine Corps electro-optic weapon systems at both shore-based and afloat sites. As an EO3 replacement program, the EO4 program objectives remain the same as EO3. Specifically: (1) provide test capability for existing and emerging electro-optic weapon systems and components; (2) increase ready basic aircraft (RBA) metrics (operational availability); (3) reduce life-cycle costs; (4) improve sustainability at intermediate and depot levels of maintenance; and (5) reduce proliferation of unique test equipment.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0852 / *Consolidated Auto Support System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: eCASS Development	0.316	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Develop, integrate and test an Automatic Test System (ATS) to replace legacy CASS systems. The new ATS will be compatible with and capable of hosting the hundreds of existing Test Programs that are currently utilized on legacy CASS at the Intermediate and Depot levels of maintenance, as well as any emerging Test Programs that may require greater test capability than provided by legacy CASS.					
FY 2019 Plans: N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: Test Technology Development	2.382	2.380	3.295	0.000	3.295
Articles:	-	-	-	-	-
Description: Develops, integrates, and evolves enhanced test capabilities and technologies for insertion into the Consolidated Automated Support System (CASS) family of test systems. As weapon system electronics evolve, new test capabilities are required to support advanced systems. Existing test capabilities must be extended in range, accuracy, time and frequency domains in order to sustain the required test accuracy ratios for weapon systems support (the automatic test system must be four times as accurate as the asset being tested).					
FY 2019 Plans: Research and evaluate solutions for next-generation inertial device, global positioning system, and video processing system test capabilities. Research and evaluate Test Program Set (TPS) software development and coding alternatives for enhanced TPS performance capabilities and reduced TPS execution time.					
FY 2020 Base Plans: Research and evaluate high-power and fiber-optic test requirements with a focus on Joint Strike Fighter. Analyze required incremental enhancements for Rack 1 of the eCASS automatic test systems.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0852 / *Consolidated Auto Support System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY20 increase for research and evaluation of alternatives for Joint Strike Fighter emerging requirements.					
Title: EO3 Technology Development	3.767	2.372	0.000	0.000	0.000
Articles:	2	-	-	-	-
Description: This project will develop, integrate and test technical solutions to resolve EO3 obsolescence issues, including a near infrared camera, that are capable of supporting the maintenance and repair of the F/A-18 ATFLIR and H-60 MTS weapon systems.					
FY 2019 Plans: Test and evaluate interoperability of two prototype near infrared camera assemblies with the existing Test Program Sets and the eCASS EO3 system to verify compatibility. Perform an EO3 system technical evaluation to determine that the near IR camera solution is reliable and maintainable. Research and analyze solutions for other EO3 obsolescence issues in order to extend the EO3 service life until a modernized EO replacement system can be developed and fielded.					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding due to realignment of efforts from EO3 Technology Development to the EO4 Development program which will replace legacy EO3 systems.					
Title: EO4 Developement	0.000	0.000	10.563	0.000	10.563
Articles:	-	-	-	-	-
Description: Design, develop, integrate, and test a Fourth Generation Electro-Optics (EO4) test system to replace the legacy EO3 test system. EO4 systems will provide the capability to test and diagnose an array of electro-optic weapons systems on F/A-18, H-60, JSF, and other aircraft platforms to support visual imaging, target identification and tracking, range finding, night-vision, and other electro-optic weapon system capabilities.					
FY 2019 Plans: N/A					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0852 / *Consolidated Auto Support System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Award an engineering and manufacturing development contract to design and develop an EO4 test system. Analyze the EO4 preliminary design to ensure it provides the capabilities required to test the requisite emerging weapon systems, including the enhanced version of the F/A-18 ATFLIR, JSF Distributed Aperature System (DAS), and the H-60 MTS electro-optic weapon systems. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase due to standup of new start EO4 program and award of EO4 development contract.					
Accomplishments/Planned Programs Subtotals	6.465	4.752	13.858	0.000	13.858

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0705: *Common Ground Equipment-CASS/ATE*	104.142	111.816	109.599	-	109.599	117.857	120.241	121.744	123.691	Continuing	Continuing

Remarks

D. Acquisition Strategy

Formal test technology reviews with industry are conducted annually (cooperative Joint Services initiative) to define maturity of needed technologies. Further studies are conducted as needed. Procurement strategy is determined by market survey and cooperative opportunities.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 0852 / *Consolidated Auto Support System*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hdw Dev - eCASS	C/CPIF	Lockheed Martin : Orlando, FL	103.592	0.316	Dec 2017	0.000		0.000		-		0.000	0.000	103.908	103.908
Primary Hdw Dev - Test Technology	C/CPFF	Various : Various	3.780	1.664	Dec 2017	1.643	Dec 2018	1.966	Dec 2019	-		1.966	Continuing	Continuing	Continuing
Primary Hdw Dev - EO3	SS/CPFF	Northrop Grumman : Rolling Meadows, IL	0.000	3.221	Mar 2018	1.839	Dec 2018	0.000		-		0.000	0.000	5.060	5.060
Primary Hdw Dev - EO4	C/CPIF	TBD : TBD	0.000	0.000		0.000		7.919	Feb 2020	-		7.919	14.493	22.412	22.412
Prior Year Prod Dev no longer funded in the FYDP	Various	Various : Various	28.397	0.000		0.000		0.000		-		0.000	0.000	28.397	-
		Subtotal	135.769	5.201		3.482		9.885		-		9.885	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
eCASS Support	WR	Various : Various	5.895	0.000		0.000		0.000		-		0.000	0.000	5.895	-
eCASS Support	WR	NAWC AD : Lakehurst, NJ	8.955	0.000		0.000		0.000		-		0.000	0.000	8.955	-
Test Technology Support	WR	NAWC AD : Lakehurst, NJ	1.260	0.674	Dec 2017	0.689	Dec 2018	1.280	Dec 2019	-		1.280	Continuing	Continuing	Continuing
EO3 Support	WR	NAWC AD : Lakehurst, NJ	0.000	0.497	Dec 2017	0.480	Dec 2018	0.000		-		0.000	0.000	0.977	-
EO4 Support	WR	NAWC AD : Lakehurst, NJ	0.000	0.000		0.000		2.567	Dec 2019	-		2.567	7.295	9.862	-
Prior Year Support no longer funded in the FYDP	Various	Various : Various	12.853	0.000		0.000		0.000		-		0.000	0.000	12.853	-
		Subtotal	28.963	1.171		1.169		3.847		-		3.847	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 0852 / *Consolidated Auto Support System*	

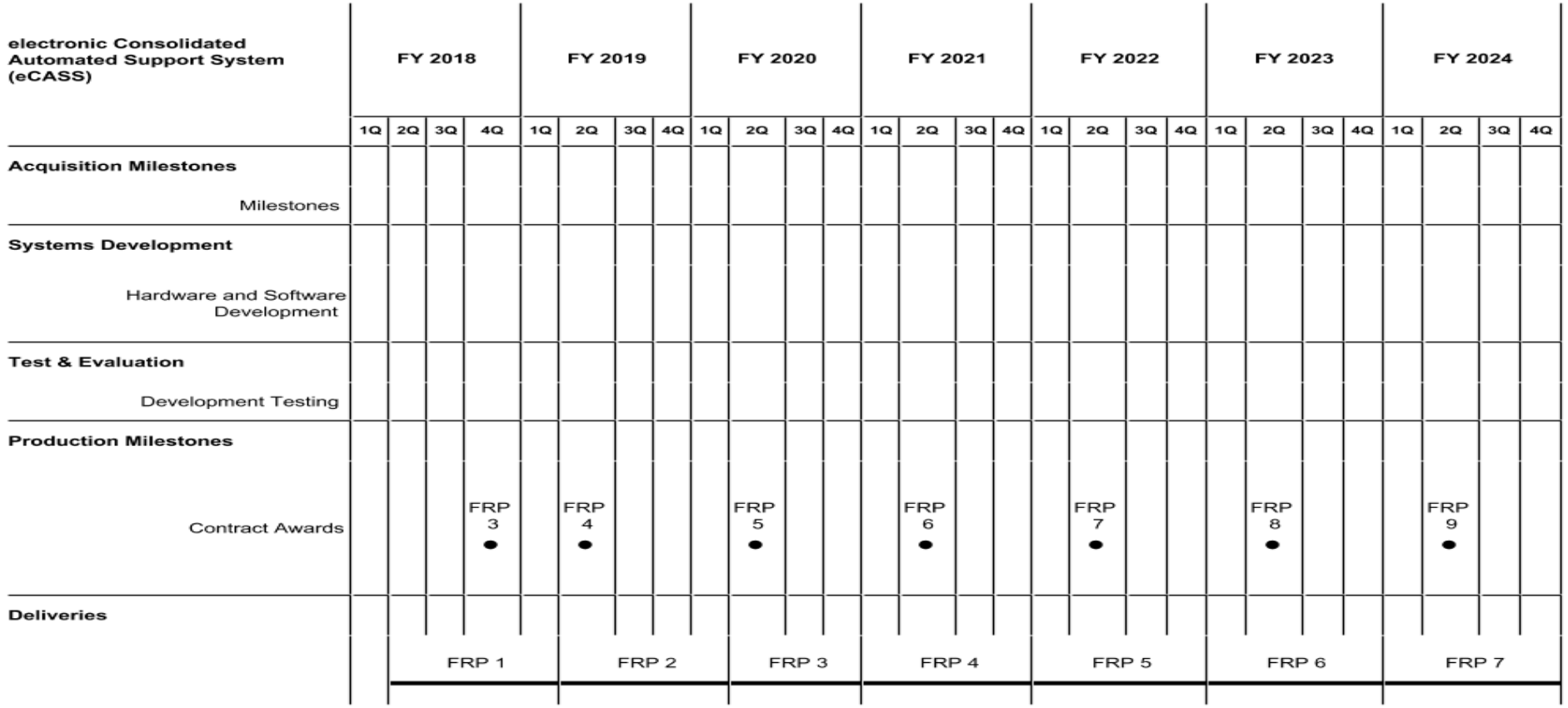
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
eCASS Travel	WR	Various : Various	0.990	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Test Tech Travel	WR	Various : Various	0.306	0.044	Nov 2017	0.048	Nov 2018	0.050	Nov 2019	-		0.050	Continuing	Continuing	Continuing
EO3 Travel	WR	Various : Various	0.000	0.049	Nov 2017	0.053	Nov 2018	0.000		-		0.000	0.000	0.102	-
EO4 Travel	WR	Various : Various	0.000	0.000		0.000		0.076	Nov 2019	-		0.076	0.000	0.076	-
Prior Year Mgmt no longer funded in the FYDP	Various	Various : Various	1.669	0.000		0.000		0.000		-		0.000	0.000	1.669	-
		Subtotal	2.965	0.093		0.101		0.126		-		0.126	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	167.697	6.465		4.752		13.858		-		13.858	Continuing	Continuing	N/A

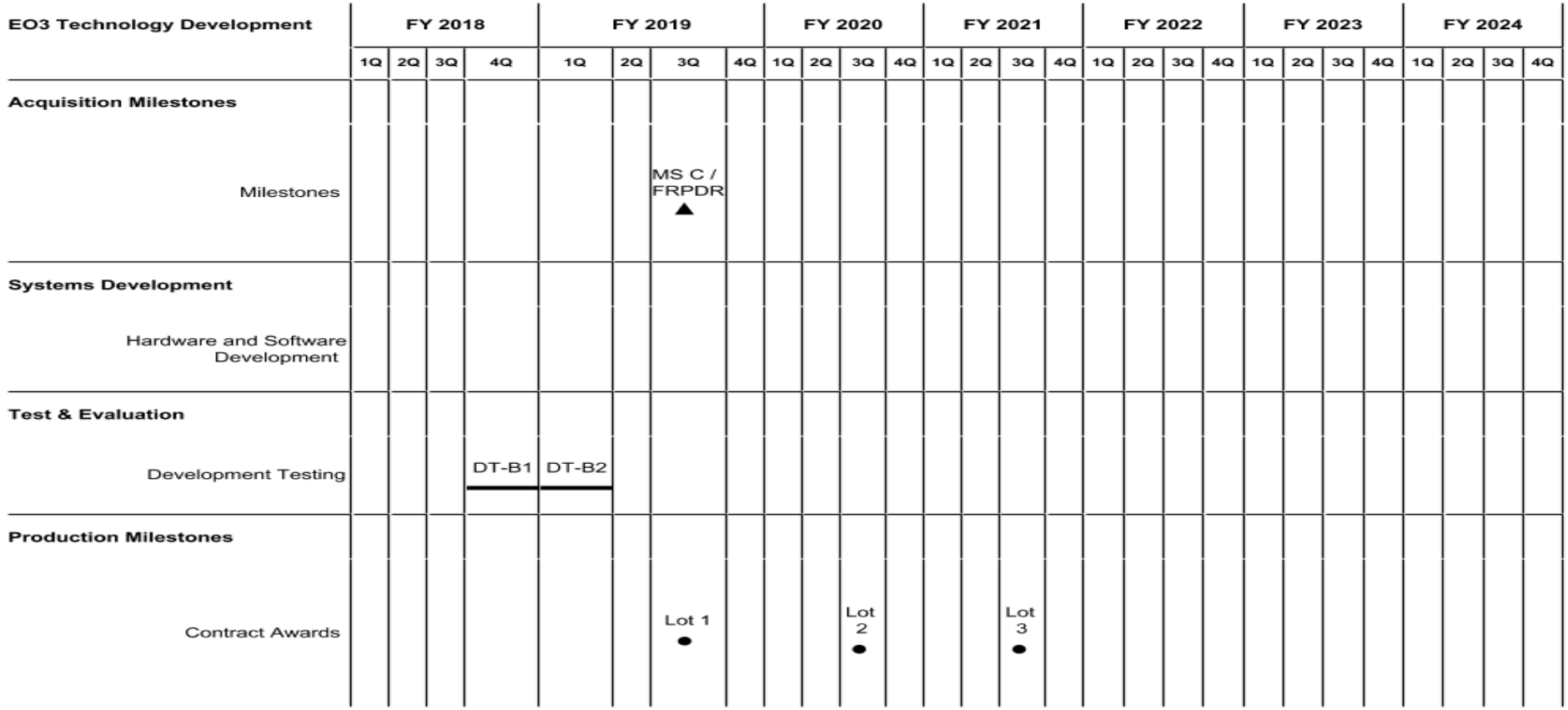
Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0852 / *Consolidated Auto Support System*



2020DON - 0205633N - 0852

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0852 / *Consolidated Auto Support System*



2020DON - 0205633N - 0852

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0852 / *Consolidated Auto Support System*

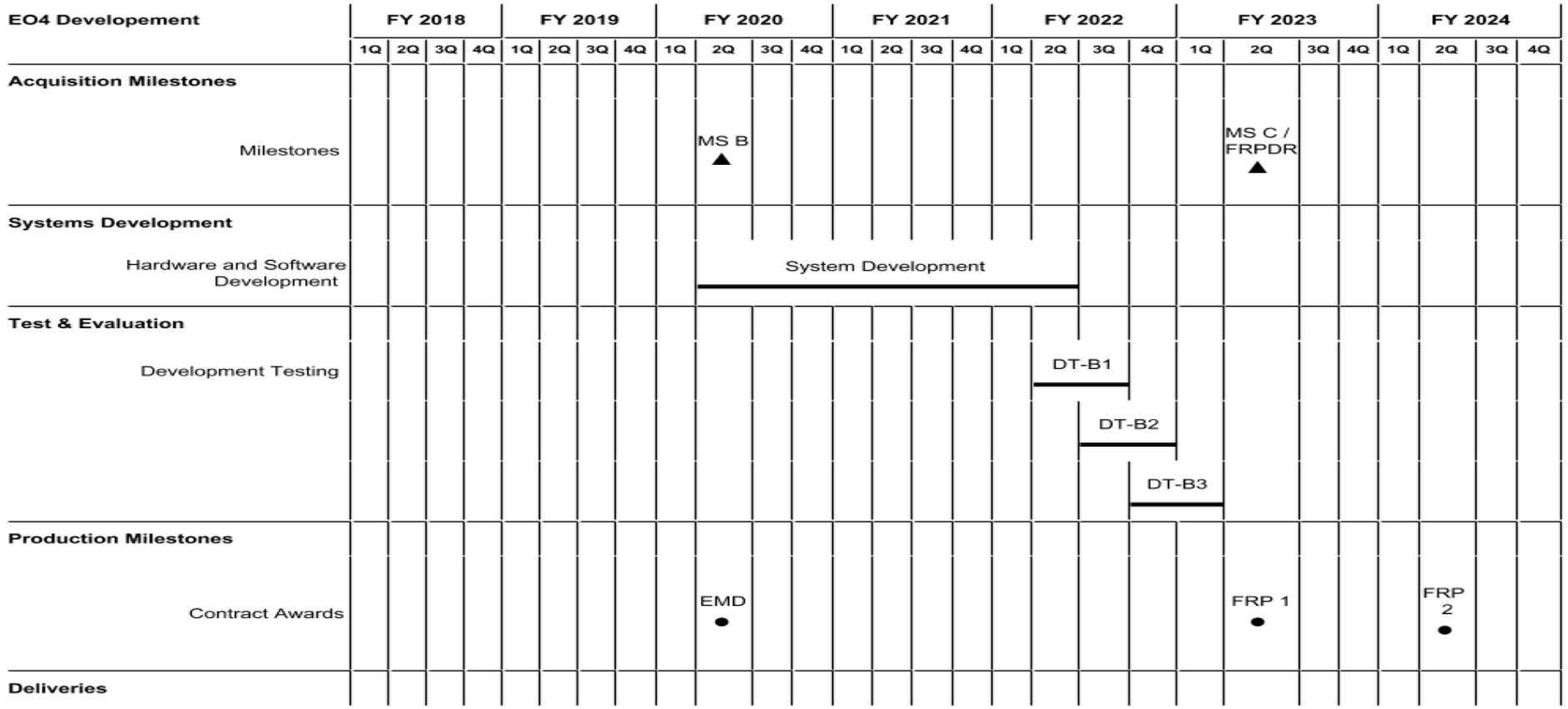


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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 0852 / *Consolidated Auto Support System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
electronic Consolidated Automated Support System (eCASS)				
Production Milestones: Contract Awards: eCASS FRP 3-APN	4	2018	4	2018
Production Milestones: Contract Awards: eCASS FRP 4-APN	2	2019	2	2019
Production Milestones: Contract Awards: eCASS FRP 5-APN	2	2020	2	2020
Production Milestones: Contract Awards: eCASS FRP 6-APN	2	2021	2	2021
Production Milestones: Contract Awards: eCASS FRP 7-APN	2	2022	2	2022
Production Milestones: Contract Awards: eCASS FRP 8-APN	2	2023	2	2023
Production Milestones: Contract Awards: eCASS FRP 9-APN	2	2024	2	2024
Deliveries: eCASS FRP 1	2	2018	1	2019
Deliveries: eCASS FRP 2	2	2019	1	2020
Deliveries: eCASS FRP 3	2	2020	4	2020
Deliveries: eCASS FRP 4	1	2021	4	2021
Deliveries: eCASS FRP 5	1	2022	4	2022
Deliveries: eCASS FRP 6	1	2023	4	2023
Deliveries: eCASS FRP 7	1	2024	4	2024
EO3 Technology Development				
Acquisition Milestones: Milestones: Milestone C / FRPDR	3	2019	3	2019
Test & Evaluation: Development Testing: Design Verification Testing: DT-B1	1	2019	1	2019
Test & Evaluation: Development Testing: Regression Testing: DT-B2	2	2019	2	2019
Production Milestones: Contract Awards: Lot 1 - 33 Units-APN	3	2019	3	2019
Production Milestones: Contract Awards: Lot 2 - 32 Units-APN	3	2020	3	2020
Production Milestones: Contract Awards: Lot 3 - 26 Units-APN	3	2021	3	2021
EO4 Developement				

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Acquisition Milestones: Milestones: Milestone B	2	2020	2	2020
Acquisition Milestones: Milestones: Milestone C / FRPDR	2	2023	2	2023
Systems Development: Hardware and Software Development: System Development	2	2020	2	2022
Test & Evaluation: Development Testing: Design Verification Testing: DT-B1	2	2022	3	2022
Test & Evaluation: Development Testing: Environmental Testing: DT-B2	3	2022	4	2022
Test & Evaluation: Development Testing: Government Testing: DT-B3	4	2022	1	2023
Production Milestones: Contract Awards: EMD	2	2020	2	2020
Production Milestones: Contract Awards: FRP1-APN	2	2023	2	2023
Production Milestones: Contract Awards: FRP2-APN	2	2024	2	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1041: *Acft Equip Repl/Maint Prog*	58.222	3.263	3.369	3.452	-	3.452	3.484	3.555	3.624	3.698	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Aircraft Equipment Reliability/Maintainability Improvement Program (AERMIP) is the only Navy program which provides Research, Development, Test & Evaluation engineering support specifically for in-service, out-of-production aircraft equipment. AERMIP increases readiness through reliability, maintainability, and safety improvements to existing systems and equipment installed in Naval aircraft. It also provides a transition vehicle to deploy Total Ownership Cost reduction initiatives through flight-test support and Fleet Test & Evaluation. It meets affordable readiness objectives by providing a cost-effective solution to obsolescence problems encountered when service lives are extended. AERMIP promotes commonality and standardization across aircraft platform lines and among the services through extension of application and use of non-developmental items. AERMIP also decreases life cycle costs through reduced operational and support costs. AERMIP facilitates the Operational, Safety and Improvement Program by applying proven low-risk solutions to current fleet problems. AERMIP also funds high-priority flight testing which is not associated with any acquisition or development program under the Flight Test General task.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Avionics and Wiring	0.268	0.416	0.440	0.000	0.440
Articles:	-	-	-	-	-
FY 2019 Plans: Test and evaluate equipment for effectiveness of wiring diagnostics and prognostics. Address avionics related reliability/maintainability issues impacting multiple aircraft platforms while continuing to investigate high value return on investment initiatives. Qualify additional material or pieces of equipment and the procedures or processes required for implementation.					
FY 2020 Base Plans: Test and evaluate equipment for effectiveness of wiring diagnostics and prognostics. Address avionics related reliability/maintainability issues impacting multiple aircraft platforms while continuing to investigate high value return on investment initiatives. Qualify additional material or pieces of equipment and the procedures or processes required for implementation.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1041 / *Acft Equip Repl/Maint Prog*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
No significant change from FY 2019 to FY 2020					
Title: Air Vehicle	2.322	2.040	2.069	0.000	2.069
Articles:	-	-	-	-	-
FY 2019 Plans: Based on advancement in technology, test and qualify new materials or equipment and the procedures/process required for their implementation to improve operational reliability, while containing cost growth. Continue to test and qualify improved corrosion preventative compounds. Address subsystem related reliability/maintainability issues impacting multiple aircraft platforms while continuing to investigate high value return on investment initiatives. Maintain efforts to qualify improved methods of structural component repair.					
FY 2020 Base Plans: Based on advancement in technology, test and qualify new materials or equipment and the procedures/process required for their implementation to improve operational reliability, while containing cost growth. Continue to test and qualify improved corrosion preventative compounds. Address subsystem related reliability/maintainability issues impacting multiple aircraft platforms while continuing to investigate high value return on investment initiatives. Maintain efforts to qualify improved methods of structural component repair.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: No significant change from FY 2019 to FY 2020					
Title: Systems Engineering Revitalization	0.673	0.913	0.943	0.000	0.943
Articles:	-	-	-	-	-
FY 2019 Plans: Continue the transition to model based system engineering methodology. Continue to develop and establish infrastructure and tools for an Integrated Modeling Environment. Establish processes and procedures for developing and extending systems models. Develop standard model libraries and stereotypes for NAVAIR use. Continue research in relevant technical areas.					
FY 2020 Base Plans: Continue the transition to model based system engineering methodology. Continue to develop and establish					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
infrastructure and tools for an Integrated Modeling Environment. Establish processes and procedures for developing and extending systems models. Develop standard model libraries and stereotypes for NAVAIR use. Continue research in relevant technical areas. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Accomplishments/Planned Programs Subtotals	3.263	3.369	3.452	0.000	3.452

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a non-ACAT program. Procurement strategy is determined by market survey and cooperative opportunities.

E. Performance Metrics

The Aircraft Equipment Reliability/Maintainability Improvement Program (AERMIP) program will, at a minimum, fund 8 to 15 projects a year that investigate and evaluate reliability and maintainability improvements to in-service, out-of-production aircraft equipment. AERMIP projects will have a greater than 75% success rate of insertion into Department of the Navy warfighting systems or support infrastructure.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Sys Eng - Avionics/Wiring	WR	NAWCAD : Patuxent River, MD	9.074	0.267	Oct 2017	0.276	Oct 2018	0.270	Oct 2019	-		0.270	Continuing	Continuing	Continuing
Sys Eng - Avionics/Wiring	C/FFP	Various : Various	2.755	0.055	Jan 2018	0.060	Jan 2019	0.080	Jan 2020	-		0.080	0.000	2.950	2.950
Sys Eng - Avionics/Wiring	WR	FRC-E : Cherry Point, NC	0.110	0.010	Nov 2017	0.010	Nov 2018	0.020	Nov 2019	-		0.020	Continuing	Continuing	Continuing
Sys Eng - Avionics/Wiring	WR	FRC-SE : Jacksonville, FL	0.010	0.010	Nov 2017	0.010	Nov 2018	0.010	Nov 2019	-		0.010	Continuing	Continuing	Continuing
Sys Eng - Avionics/Wiring	WR	FRC-SW : San Diego, CA	0.010	0.010	Nov 2017	0.010	Nov 2018	0.010	Nov 2019	-		0.010	Continuing	Continuing	Continuing
Sys Eng - Air Vehicle	WR	NAWCAD : Patuxent River, MD	11.757	1.169	Oct 2017	0.245	Nov 2018	1.119	Nov 2019	-		1.119	Continuing	Continuing	Continuing
Sys Eng - Air Vehicle	WR	FRC-SW : San Diego, CA	2.381	0.025	Nov 2017	0.175	Nov 2018	0.300	Nov 2019	-		0.300	Continuing	Continuing	Continuing
Sys Eng - Air Vehicle	WR	FRC-E : Cherry Point, NC	2.101	0.025	Nov 2017	0.060	Nov 2018	0.150	Nov 2019	-		0.150	Continuing	Continuing	Continuing
Sys Eng - Air Vehicle	WR	FRC-SE : Jacksonville, FL	1.216	0.020	Nov 2017	0.020	Nov 2018	0.100	Nov 2019	-		0.100	Continuing	Continuing	Continuing
Sys Eng - Air Vehicle	C/FFP	Various : Various	0.962	0.800	Jan 2018	1.390	Jan 2019	0.250	Dec 2019	-		0.250	0.000	3.402	3.402
Sys Eng - Air Vehicle	C/CPFF	Innovative Technology, Inc. : Santa Barbara, CA	0.100	0.000		0.000		0.000		-		0.000	0.000	0.100	0.100
Sys Eng - SE Revitalization	WR	NAWCAD : Patuxent River, MD	0.997	0.018	Nov 2017	0.006	Dec 2018	0.019	Dec 2019	-		0.019	Continuing	Continuing	Continuing
Sys Eng - SE Revitalization	C/FFP	Engility Corp. : Chantilly, VA	5.027	0.325	Jan 2018	0.232	May 2019	0.234	Feb 2020	-		0.234	0.000	5.818	5.818
Sys Eng - SE Revitalization	C/CPFF	Stevens Inst of Technology : Hoboken, NJ	2.270	0.329	Dec 2017	0.675	Jan 2019	0.690	Feb 2020	-		0.690	0.000	3.964	3.964
Prior Year Sys Eng NAE/ Prod Dev no longer funded in the FYDP	Various	Various : Various	2.713	0.000		0.000		0.000		-		0.000	0.000	2.713	-
		Subtotal	41.483	3.063		3.169		3.252		-		3.252	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 1041 / *Acft Equip Repl/Maint Prog*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Support cost no longer funded in the FYDP	Various	Various : Various	12.480	0.000		0.000		0.000		-		0.000	0.000	12.480	-
		Subtotal	12.480	0.000		0.000		0.000		-		0.000	0.000	12.480	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	2.288	0.200	Oct 2017	0.200	Oct 2018	0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing
Prior Year Mgmt cost no longer funded in the FYDP	Various	Various : Various	1.971	0.000		0.000		0.000		-		0.000	0.000	1.971	-
		Subtotal	4.259	0.200		0.200		0.200		-		0.200	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	58.222	3.263		3.369		3.452		-		3.452	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1041 / *Acft Equip Repl/Maint Prog*

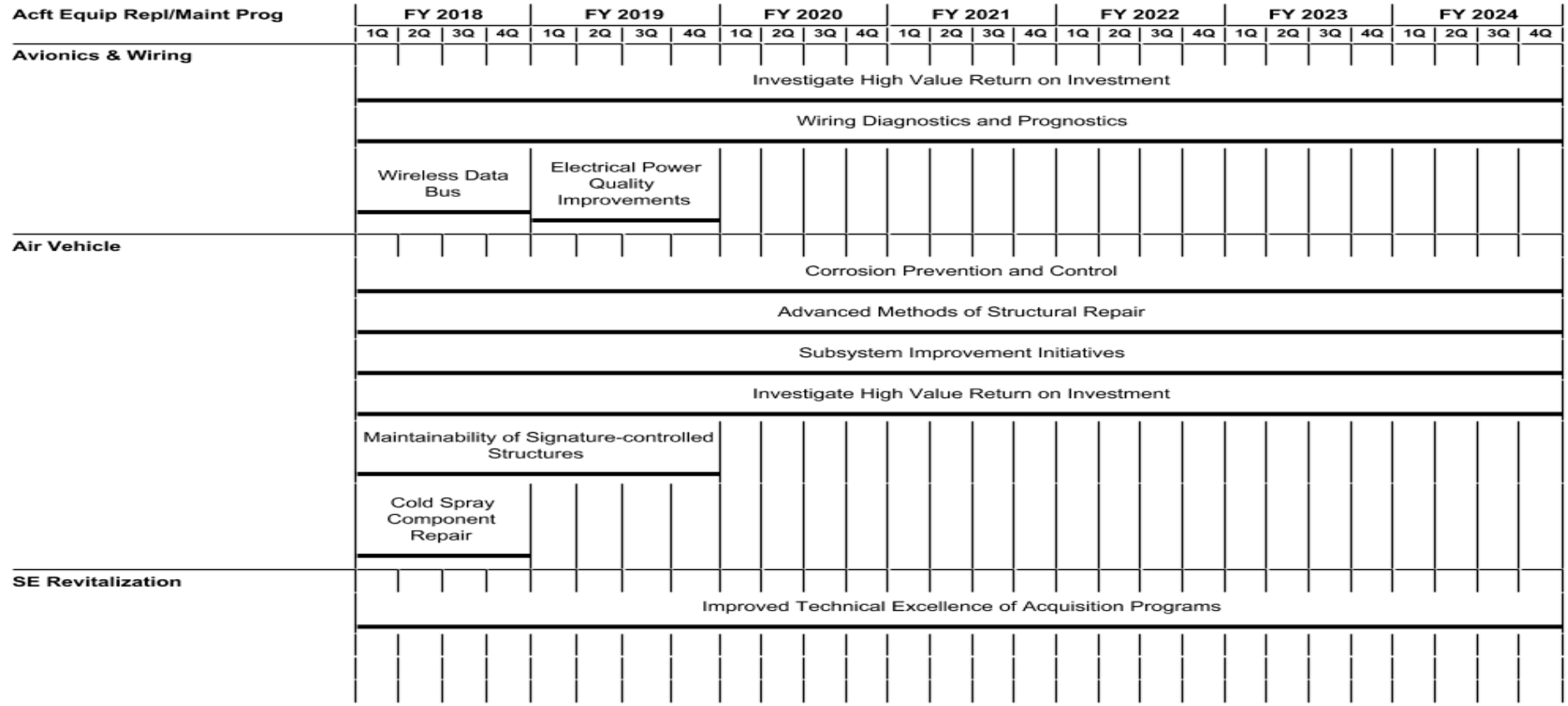

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1041 / *Acft Equip Repl/Maint Prog*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Acft Equip Repl/Maint Prog				
Avionics & Wiring: Investigate High Value Return on Avionics & Wiring Investment	1	2018	4	2024
Avionics & Wiring: Wiring Diagnostics and Prognostics	1	2018	4	2024
Avionics & Wiring: Wireless Data Bus	1	2018	4	2018
Avionics & Wiring: Electrical Power Quality Improvements	1	2019	4	2019
Air Vehicle: Corrosion Prevention and Control	1	2018	4	2024
Air Vehicle: Advanced Methods of Structural Repair	1	2018	4	2024
Air Vehicle: Subsystem Improvement Initiatives	1	2018	4	2024
Air Vehicle: Investigate High Value Return on Air Vehicle Investment	1	2018	4	2024
Air Vehicle: Maintainability of Signature-controlled Structures	1	2018	4	2019
Air Vehicle: Cold Spray Component Repair	1	2018	4	2018
SE Revitalization: Improved Technical Excellence of Acquisition Programs	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 1355 / *Propulsion and Power Component Improvement Program*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1355: *Propulsion and Power Component Improvement Program*	1,143.526	91.528	105.223	99.372	-	99.372	112.398	110.823	108.785	110.953	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The FY 2020 funding request was reduced by $9 million to account for the availability of prior year execution balances.

A. Mission Description and Budget Item Justification

The Propulsion and Power (P&P) Component Improvement Program (CIP) provides the only source of critical design and development engineering support to resolve safety, reliability and maintainability deficiencies of in-service Navy and Marine Corps aircraft propulsion systems. The highest priority issues P&P CIP addresses concern safety-of-flight deficiencies, which account for approximately 80% of P&P CIP efforts. The program also corrects service-revealed deficiencies, improves Operational Readiness and Reliability and Maintainability, and reduces platform Life Cycle Cost. Budgets are allocated across platform-specific teams and multi-platform product support teams based upon long term strategies to achieve safety and affordable readiness goals; the R-3 exhibit details annual portions of those long-term strategies. P&P CIP tasks have reduced the rate of in-flight aborts, safety incidents, non-mission capable rates, scheduled and unscheduled engine removals, maintenance work hours, and overall cost of ownership. This is accomplished through the maintenance and validation of specification performance, testing to qualify engineering changes, verifying life limits, and improving the inherent reliability of the propulsion and power systems as an integral part of Reliability Centered Maintenance initiatives. Historically, the missions, tactics, and environmental exposure of military aircraft systems change to meet new threats or operational demands, and often result in unforeseen problems, which if not corrected, can cause critical safety/readiness degradation, such as those experienced during OPERATIONS DESERT SHIELD/DESERT STORM, ENDURING FREEDOM, and IRAQI FREEDOM due to sand erosion. In addition, new problems arise through actual fleet deployment and usage of the aircraft. System development programs, while geared to resolve as many problems as possible before deployment, cannot duplicate actual operations or account for the vast array of environmental and usage variables, particularly when aircraft missions vary from those that the aircraft was designed to perform. Therefore, it has been found that P&P CIP can provide an immediate engineering response to these flight-critical problems and accelerated engine testing can avoid potential problems. P&P CIP starts after development and Navy acceptance of the first production article and addresses usage and life problems not covered by warranties. P&P CIP addresses engines, transmissions, propellers, starters, auxiliary power units, electrical generating systems, aircraft wiring, and fuel and lubricant systems. These efforts continue over the system's life, gradually decreasing to a minimum level sufficient to maintain the reliability, and decrease the operating costs, of older inventory. P&P CIP is a highly leveraged and cooperative tri-service program with Foreign Military Sales participation.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: P3, E2, C2, C130 (T56)	11.000	10.300	10.200	0.000	10.200
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Continue joint projects with the USAF on the T56 Series III engine on the analysis, design and qualification of improvements to the front turbine bearing cage, front turbine bearing support, front bearing chamber labyrinth seal, engine parts and propeller brake lining obsolescence and repair engineering development. Execute engine Accelerated Mission Test. For the T56 Series IV engine perform analysis, design and qualification work related to engine performance standardization, rub tolerant turbine blades, fuel nozzle anti-coke coating, step up gearbox oil leakage and updated software for the propulsion control and monitoring unit. Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power systems. ***FY 2020 Base Plans:*** Continue joint projects with the USAF on the T56 Series III engine on the analysis, design and qualification of improvements to address Service Revealed Deficiencies and preform repair engineering development to system components including bearings, seals and drives, the compressor, combustor, turbine, control system, static structures, and gearboxes. For the T56 Series IV engine perform analysis, design and qualification work related to address Service Revealed Deficiencies and safety, readiness and cost drivers on system components and execute projects on engine performance standardization, rub tolerant turbine blades, fuel nozzle anti-coke coating, step up gearbox oil leakage and updated software for the propulsion control and monitoring unit. Develop, design and test improvements to system components including the compressor, combustor, turbine, controls and diagnostic systems, static structures, gearboxes, bearings, seals, drives, engine fuel and lubrication systems and auxiliary power, and electrical power systems. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Title: E2/C2/C130/P3 (Props)	1.500	3.600	3.500	0.000	3.500
Articles:	-	-	-	-	-
FY 2019 Plans: Develop, design and test 54H60 and NP2000 Propeller system improvements including control, pitch actuation, hydraulics, blades, pumps, housings, seals and static structure projects to improve safety, reliability, maintainability, affordability, durability and Readiness including efforts on repair and reliability engineering,					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
universal closed loop bench test system, database development and management. For the NP2000 perform analysis, design and testing on the modern pump housing and onboard propeller balance monitoring system. ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety, readiness and cost drivers on system components for the 54H60 and NP2000 propeller systems. Develop, design and test 54H60 and NP2000 Propeller system improvements to the control, pitch actuation and hydraulic systems, blades, pumps, housings, seals and static structure to improve safety, reliability, maintainability, affordability, durability and Readiness. Execute engineering efforts on repair and reliability engineering, universal closed loop bench test system, fleet metric database development and management and perform analysis, design and testing on the NP200 modern pump housing and onboard propeller balance monitoring systems. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Title: SH-60B/F, HH-60H, MH-60R/S (T700)	5.678	5.700	5.200	0.000	5.200
Articles:	-	-	-	-	-
FY 2019 Plans: Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power systems. Perform analysis, design and testing on projects to improve the compression system and static structures tolerance to sand ingestion, engine performance modeling and engine build optimization. Perform analysis, modeling design and testing on projects related to air vehicle drive system damage tolerance and reparability. Conduct lithium battery qualification testing. Perform engine testing to develop and qualify design improvements. ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety, readiness and cost drivers on the T700 propulsion and power system components including the compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, engine fuel and lubrication systems, auxiliary power and electrical power systems, and main and tail rotor					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
drives systems. Perform analysis, design and testing on projects to improve the compression system and static structures tolerance to sand ingestion, update engine performance modeling and engine build optimization. Perform analysis, modeling design and testing on projects related to air vehicle drive system damage tolerance and reparability. Conduct lithium battery qualification testing. Perform engine and component testing to develop and qualify design improvements. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease requirement for engineering support of the T700-GE-401/401C Engine and Propulsion System.					
Title: H-1 (T400/T700) ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety readiness and cost drivers on the T700 propulsion and power system components including the compressor, combustor, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power, electrical power systems and main and tail rotor drives systems. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase provides funding for service revealed deficiencies.	0.431 -	0.000 -	0.500 -	0.000 -	0.500 -
Title: AV-8B (F402) ***Articles:*** ***FY 2019 Plans:*** Continue working on risk management plan of supplying critical parts and refinement of life limit determinations and identification of critical parts constraints. Perform analysis, design and testing related to improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power systems, Hydro	3.849 -	3.430 -	3.450 -	0.000 -	3.450 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
mechanical unit PMA gear, FOD detection system, brake seal redesign to improve safety, reliability, maintainability, affordability, durability and Readiness. ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety readiness and cost drivers on the F402 propulsion and power system components including the fan, compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, engine fuel and lubrication systems, auxiliary power, electrical power and FOD detection systems. Continue working on risk management plan of supplying critical parts and refinement of life limit determinations and identification of critical parts constraints to improve safety, reliability, maintainability, affordability, durability and Readiness. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Title: H-53/H-46/H-3 (T58/T64)	4.530	3.800	3.800	0.000	3.800
Articles:	-	-	-	-	-
FY 2019 Plans: Perform analysis, design and testing related to projects to develop inspection and repair criteria and optimized depot-level engine build specification practices and procedures, data reduction program implementation, compressor case coating improvements and remote idle cable interface system. Update engine mission usage and hardware life management plans. Evaluate engine fuel nozzle anti-coking coatings. Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power systems to improve safety, reliability, maintainability, affordability, durability and Readiness. ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and Safety Readiness. Analyze cost drivers on the T64 propulsion and power system components including the compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems and air vehicle drive system components. Improve safety, reliability, maintainability, affordability, durability and Readiness.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Perform analysis, design and testing to develop inspection and repair criteria, optimized depot-level engine build specification procedures, and data reduction program implementation. Update engine mission usage and hardware life management plans. ***FY 2020 OCO Plans:*** N/A					
Title: F-18 C/D/E/F (F414/F404)	16.926	19.758	19.750	0.000	19.750
Articles:	-	-	-	-	-
FY 2019 Plans: Perform analysis, design and testing related to F404 electrical control assembly obsolescence recovery, improved engine vibration measurement system, and evaluation of fan blade dovetail coatings to improve durability. Perform rotor spin testing of engine fan to verify surface treatment life benefit. Perform analysis, design and testing related to application of data analytics tools to identify engine removal driver causes, F414 engine main fuel manifold life extension, high-pressure turbine blades redesign, oil system improvements, engine VEN hydro-mechanical failure events, composite outer bypass duct delamination, compressor discharge pressure anti-ice valve VEN position transmitter system, engine build optimization and FADEC obsolescence. Perform engine accelerated simulated mission endurance testing. Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power, augmentor and exhaust systems to improve safety, reliability, maintainability, affordability, durability and Readiness.					
FY 2020 Base Plans: Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety readiness and cost drivers on propulsion and power system components for the F414 and F404 turbofan engines including the fan, compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems, augmenter and exhaust systems to improve reliability, maintainability, affordability, durability. Perform engine and component test programs including rotor spin tests and accelerated simulated mission endurance testing.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
No significant change from FY 2019 to FY 2020					
Title: T-45 (F405)	3.021	2.446	2.450	0.000	2.450
Articles:	-	-	-	-	-
FY 2019 Plans: Perform analysis, design and testing on projects to verify improved blade dovetail coating, engine cyclic usage assessment to update rotating engine part lives and mitigation approaches to address propulsion and power system component obsolescence issues and engine performance degradation. Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power systems to improve safety, reliability, maintainability, affordability, durability and Readiness.					
FY 2020 Base Plans: Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety readiness and cost drivers on the F405 propulsion and power system components including fan, compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems to improve safety, reliability, maintainability, affordability, durability and Readiness. Perform analysis, design and testing on projects to update rotating engine part lives and mitigation approaches to address propulsion and power system component obsolescence issues and engine performance degradation.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: No significant change from FY 2019 to FY 2020					
Title: V-22 Propulsion	4.236	5.200	6.100	0.000	6.100
Articles:	-	-	-	-	-
FY 2019 Plans: Perform analysis, design and testing on projects to mitigate rapid power loss and engine surge, update engine part lives and management plan with updated mission mix, prop rotor input quill clutch system redesign and improved power assurance check accuracy to improve mission planning. Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power systems to					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
improve safety, reliability, maintainability, affordability, durability and Readiness. Perform engine analytical condition inspections, air vehicle drive system damage tolerance assessment and turbine rig and full scale engine testing. ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and Readiness and cost drivers on the AE1107C propulsion and power system components the compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems and prop rotor drive systems to improve safety, reliability, maintainability, affordability, durability and Readiness. Perform analysis, design and testing on projects to mitigate rapid power loss and engine surge, and improve engine durability and operability, update engine part lives and management plan with updated mission mix, execute prop rotor input quill clutch system redesign and improve power assurance check accuracy to improve mission planning. Perform engine analytical condition inspections, air vehicle drive system damage tolerance assessment and turbine rig and full scale engine testing. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in funding supports RDT&E uninstalled engine testing to mitigate fleet safety risks.					
Title: Adversary (J85) (F100)	2.660	2.200	2.240	0.000	2.240
Articles:	-	-	-	-	-
FY 2019 Plans: Continue joint projects with the USAF to perform analysis, design and testing on projects to validate the life assessment of J85 critical rotating compressor hardware, address parts obsolescence issues, evaluate hardware inspection data, and perform stress modeling to update life limits, implement upgraded engine performance monitoring system, and implement improved turbine thermocouple probe and harness redesign. Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power, augmenter and exhaust systems to improve safety, reliability, maintainability, affordability, durability and Readiness. ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and Readiness and cost drivers on the J85 and F100 propulsion and power system components including the fan, compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems, augmenter and exhaust systems to improve safety, reliability, maintainability, affordability, durability. Continue joint projects with the USAF to perform analysis, design and testing on projects to validate the life assessment of J85 critical rotating hardware, address parts obsolescence issues, evaluate hardware inspection data, and perform stress modeling to update life limits, implement upgraded engine performance monitoring system, and implement improved turbine thermocouple probe and harness redesign. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Title: Joint Strike Fighter (F135 Engine)	30.388	33.526	24.524	0.000	24.524
Articles:	-	-	-	-	-
FY 2019 Plans: Continue to work with Joint Program Office, USAF, international partners, and foreign military sales customers to develop engineering project descriptions to resolve service revealed deficiencies. Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power, augmenter, exhaust and STOVL Lift system to improve safety, reliability, maintainability, affordability, durability and Readiness. Perform engine testing and STOVL propulsion system testing ant government and contractor test facilities. ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety readiness and cost and reliability drivers on propulsion and power system components of the F135 engine and STOVL lift system in accordance with F-35 Program Instruction 1540.05 F135 CIP Management Guide for the F135 Propulsion System Component Improvement Program. Develop, design and test improvements to system components including the fan, compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems, augmenter, exhaust and STOVL Lift system to improve safety, reliability, maintainability, affordability,					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
durability and Readiness. Perform engine testing and STOVL propulsion system testing at government and contractor test facilities. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request was reduced to account for the availability of prior year execution balances.					
Title: P-8A (CFM56 Engine)	0.500	0.600	0.600	0.000	0.600
Articles:	-	-	-	-	-
FY 2019 Plans: Develop, design and test improvements to system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power systems to improve safety, reliability, maintainability, affordability, durability and Readiness. ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety readiness and cost and reliability drivers on propulsion and power system components of the CFM56 system including the fan, compressor, combustors, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems to improve safety, reliability, maintainability, affordability, and durability. ***FY 2020 OCO Plans:*** N/A					
Title: H-53K Propulsion (T408)	0.000	7.700	7.850	0.000	7.850
Articles:	-	-	-	-	-
FY 2019 Plans: Develop, design and test improvements to Propulsion & Power system components including compressors, combustors, turbines, controls, diagnostics, static structures, gearboxes, bearings, seals, drives, fuels, lubricants, auxiliary power, electrical power systems to improve safety, reliability, maintainability, affordability, durability and Readiness. Acquire an engine test vehicle to qualify design changes developed under the component improvement program. ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Perform engineering analysis, design and test efforts to address identified deficiencies and safety readiness and cost and reliability drivers on the T408 propulsion and power system components including the compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems and main and tail rotor drive systems to improve safety, reliability, maintainability, affordability, durability. Acquire an engine test vehicle to qualify design changes developed under the component improvement program and perform component level and uninstalled engine testing. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change FY 2019 to FY 2020					
Title: Multi-Platform Product Support Teams	6.809	6.963	7.158	0.000	7.158
Articles:	-	-	-	-	-
FY 2019 Plans: Continue projects to provide common support to multiple platforms in the areas of improved drive systems, secondary power, and mechanical systems; improve tools for performance analysis, modeling and simulation, diagnostics, engine reliability assessment, and structural integrity; improve products and processes for fuels, lubricants, and refueling equipment; and improve electrical system product support, wiring, and battery systems. Includes funding for Government Furnished Equipment fuel provided in support of engine developmental and qualification testing. Modernize RDTE test facilities as required to qualify component design improvements. ***FY 2020 Base Plans:*** Continue projects to provide support to multiple platforms to analyze fleet component removal driver and reliability metrics to focus CIP investments to maximize return on investment, improve performance analysis, structural integrity modeling and simulation tools, and developmental test and evaluation facilities and procedures for propulsion and power system including engines, drive systems, fuels and lubricants, auxiliary power and electrical power systems. Includes funding for Government Furnished Fuel for research and development test and evaluation programs to evaluate and qualify component design improvements to improve safety, readiness, reliability, maintainability and durability. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.					
Title: MQ-4C (AE3007 Engine) ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety readiness and cost and reliability drivers on the AE3007 propulsion and power system components including the fan, compressor, combustor, turbines, control and diagnostic systems, static structures, gearboxes, bearings, seals, drives, fuel and lubrication systems, auxiliary power and electrical power systems to improve safety, reliability, maintainability, affordability, and durability. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase supports startup of CIP projects for the AE3007 turbofan propulsion and power system in the Triton Air Vehicle.	0.000 -	0.000 -	1.400 -	0.000 -	1.400 -
Title: UAV Programs (Various) ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Perform engineering analysis, design and test efforts to address Service Revealed Deficiencies and safety readiness and cost and reliability drivers on the propulsion and power systems for small and medium size Unmanned Air Vehicles (UAVs) including the RQ-21 Small Tactical Unmanned Aerial System (STUAS). Develop, design and test improvements to system components including the engine components, control and diagnostic systems, static structures, bearings, seals, drives, fuel and lubrication systems, ignition and electrical	0.000 -	0.000 -	0.650 -	0.000 -	0.650 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
power systems, exhaust system and the propeller to improve safety, reliability, maintainability, affordability, and durability. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase funding for projects in the propulsion and power system in the RQ-21 Blackjack Air Vehicle.					
Accomplishments/Planned Programs Subtotals	91.528	105.223	99.372	0.000	99.372

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a NON-ACAT program. Procurement strategy is determined by market survey and cooperative opportunities.

E. Performance Metrics

The Propulsion and Power Component (P&P) Improvement Program (CIP) will support engineering design and development efforts for 100% of the safety of flight issues on in-service propulsion and power systems covered under the Program. Over the past two years, this equated to more than 200 individual Engineering Project Descriptions (EPDs). Over the past two years P&P CIP also addressed reliability and maintainability deficiencies equating to another 100 individual EPDs. These projects have been primary contributors to significant increases in aggregate engine safety and reliability across the USN/ USMC fleet. From 2009 to 2017 P&P CIP has been a primary contributor to a 35% Reduction in propulsion and power system related Class A mishaps, an 85% increase in aggregate fleet engine reliability as measured by engine Time-On Wing (TOW) and the resultant cumulative engine repair cost avoidance of $4.2B over that time span.

Program execution will be actively managed on 100% of the projects via contractor earned value data and overall obligation and expenditure rates as reflected in the Navy Enterprise Resource Planning system. Program obligation and expenditure performance will be analyzed and measured against OSD/FMB benchmarks on a monthly basis.

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Sys Eng T56 Engine Program	WR	NAWCAD : Patuxent River, MD	42.967	4.153	Nov 2017	4.100	Oct 2018	4.100	Oct 2019	-		4.100	Continuing	Continuing	Continuing
Sys Eng T56 Engine Program	SS/CPFF	Rolls Royce : Indianapolis, IN	56.368	5.973	Jan 2018	5.500	Jan 2019	5.400	Jan 2020	-		5.400	0.000	73.241	73.241
Sys Eng T56 Engine Program	WR	FRC-E : Cherry Point, NC	2.625	0.810	Nov 2017	0.500	Oct 2018	0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing
Sys Eng T56 Engine Program	WR	FRC-SE : Jacksonville, FL	0.885	0.011	Nov 2017	0.100	Oct 2018	0.100	Oct 2019	-		0.100	Continuing	Continuing	Continuing
Sys Eng T56 Engine Program	WR	FRC-SW : North Island, CA	0.125	0.053	Nov 2017	0.100	Oct 2018	0.100	Oct 2019	-		0.100	Continuing	Continuing	Continuing
Sys Eng Props Program	SS/CPFF	Hamilton Sundstrand : Windsor Locks, CT	28.433	1.500	Jan 2018	3.600	Jan 2019	3.500	Jan 2020	-		3.500	0.000	37.033	37.033
Sys Eng J52 Engine Program	WR	NAWCAD : Patuxent River, MD	14.429	0.000		0.000		0.000		-		0.000	0.000	14.429	-
Sys Eng J52 Engine Program	SS/CPFF	UTC Pratt & Whitney : East Hartford, CT	41.445	0.000		0.000		0.000		-		0.000	0.000	41.445	41.445
Sys Eng J52 Engine Program	WR	FRC-E : Cherry Point, NC	0.088	0.000		0.000		0.000		-		0.000	0.000	0.088	-
Sys Eng J52 Engine Program	WR	FRC-SE : Jacksonville, FL	0.425	0.000		0.000		0.000		-		0.000	0.000	0.425	-
Sys Eng T700 Engine Program	WR	NAWCAD : Patuxent River, MD	17.741	2.186	Nov 2017	2.500	Oct 2018	2.500	Oct 2019	-		2.500	Continuing	Continuing	Continuing
Sys Eng T700 Engine Program	SS/CPFF	General Electric : Lynn, MA	34.029	3.492	Jan 2018	3.200	Jan 2019	3.200	Jan 2020	-		3.200	0.000	43.921	43.921
Sys Eng T700 Engine Program	IA	Army Research Lab : Aberdeen Proving Ground, MD	0.150	0.000		0.000		0.000		-		0.000	0.000	0.150	-
Sys Eng T400 Engine Program	WR	NAWCAD : Patuxent River, MD	3.167	0.431	Nov 2017	0.000		0.000		-		0.000	0.000	3.598	-

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Sys Eng T400 Engine Program	SS/CPFF	UTC Pratt & Whitney : East Hartford, CT	5.890	0.000		0.000		0.000		-		0.000	0.000	5.890	5.890
Sys Eng F402 Engine Program	WR	NAWCAD : Patuxent River, MD	21.114	1.693	Nov 2017	1.700	Oct 2018	1.700	Oct 2019	-		1.700	Continuing	Continuing	Continuing
Sys Eng F402 Engine Program	WR	NAWCWD : China Lake, CA	0.303	0.000		0.000		0.000		-		0.000	0.000	0.303	-
Sys Eng F402 Engine Program	WR	FRC-E : Cherry Point, NC	1.002	0.105	Nov 2017	0.130	Oct 2018	0.150	Oct 2019	-		0.150	Continuing	Continuing	Continuing
Sys Eng F402 Engine Program	MIPR	DTIC : Fort Belvoir, VA	0.028	0.000		0.000		0.000		-		0.000	0.000	0.028	-
Sys Eng F402 Engine Program	SS/CPFF	Rolls Royce : Bristol, England, UK	77.309	2.051	Jan 2018	1.600	Jan 2019	1.600	Jan 2020	-		1.600	0.000	82.560	82.560
Sys Eng F402 Engine Program	C/FFP	Hood Technology Corp : Hood River, OR	0.845	0.000		0.000		0.000		-		0.000	0.000	0.845	0.845
Sys Eng T58/T64 Engine Program	WR	NAWCAD : Patuxent River, MD	36.979	2.501	Nov 2017	2.100	Oct 2018	2.100	Oct 2019	-		2.100	Continuing	Continuing	Continuing
Sys Eng T58/T64 Engine Program	SS/CPFF	General Electric : Lynn, MA	87.771	2.029	Jan 2018	1.700	Jan 2019	1.700	Jan 2020	-		1.700	0.000	93.200	93.200
Sys Eng T58/T64 Engine Program	C/FFP	Danobat Machine Tool Co. : Humble, TX	0.149	0.000		0.000		0.000		-		0.000	0.000	0.149	0.149
Sys Eng F414/F404 Engine Program	WR	NAWCAD : Patuxent River, MD	47.675	6.009	Nov 2017	4.000	Oct 2018	4.000	Oct 2019	-		4.000	Continuing	Continuing	Continuing
Sys Eng F414/F404 Engine Program	SS/CPFF	General Electric : Lynn, MA	166.467	10.649	Jan 2018	15.508	Jan 2019	15.500	Jan 2020	-		15.500	0.000	208.124	208.124
Sys Eng F414/F404 Engine Program	WR	FRC-SE : Jacksonville, FL	0.955	0.268	Nov 2017	0.250	Nov 2018	0.250	Nov 2019	-		0.250	Continuing	Continuing	Continuing
Sys Eng F405 Engine Program	WR	NAWCAD : Patuxent River, MD	11.987	1.448	Nov 2017	1.400	Oct 2018	1.400	Oct 2019	-		1.400	Continuing	Continuing	Continuing
Sys Eng F405 Engine Program	SS/CPFF	Rolls Royce : Bristol, England, UK	37.360	1.573	Jan 2018	1.046	Jan 2019	1.050	Jan 2020	-		1.050	0.000	41.029	41.029

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Sys Eng V-22 Propulsion Program	WR	NAWCAD : Patuxent River, MD	1.677	0.961	Nov 2017	1.100	Oct 2018	2.000	Oct 2019	-		2.000	Continuing	Continuing	Continuing
Sys Eng V-22 Propulsion Program	SS/FFP	Bell- Boeing : Ft. Worth, TX	7.269	1.775	Jan 2018	2.100	Jan 2019	2.100	Jan 2020	-		2.100	0.000	13.244	13.244
Sys Eng V-22 Propulsion Program	SS/CPFF	Rolls Royce : Indianapolis, IN	3.085	2.000	Jan 2018	2.000	Jan 2019	2.000	Jan 2020	-		2.000	0.000	9.085	9.085
Sys Eng V-22 Propulsion Program	C/FFP	Nat'l Center for Manuf'g Sciences : Ann Arbor, MI	0.166	0.000		0.000		0.000		-		0.000	0.000	0.166	0.166
Sys Eng V-22 Propulsion Program	C/FFP	Univ of Dayton Research Inst. : Dayton, OH	0.040	0.000		0.000		0.000		-		0.000	0.000	0.040	0.040
Sys Eng V-22 Propulsion Program	MIPR	Army Research Lab : Aberdeen Proving Ground, MD	0.299	0.000		0.000		0.000		-		0.000	0.000	0.299	-
Sys Eng V-22 Propulsion Program	C/CPFF	UTC Pratt & Whitney : East Hartford, CT	0.138	0.000		0.000		0.000		-		0.000	0.000	0.138	0.138
Sys Eng Adversary J85 Engine Program	WR	FRC-SE : Jacksonville, FL	0.083	0.000		0.100	Nov 2018	0.100	Nov 2019	-		0.100	Continuing	Continuing	Continuing
Sys Eng Adversary J85 Engine Program	WR	NAWCAD : Patuxent River, MD	3.630	1.430	Nov 2017	1.500	Oct 2018	1.500	Oct 2019	-		1.500	Continuing	Continuing	Continuing
Sys Eng Adversary J85 Engine Program	SS/CPFF	General Electric : Lynn, MA	2.426	1.230	Jan 2018	0.600	Jan 2019	0.640	Jan 2020	-		0.640	0.000	4.896	4.896
Sys Eng Adversary J85 Engine Program	C/FFP	UTC Military Engines : East Hartford, CT	0.083	0.000		0.000		0.000		-		0.000	0.000	0.083	0.083
Sys Eng JSF Engine Program	WR	NAWCAD : Patuxent River, MD	6.977	1.000	Nov 2017	1.283	Oct 2018	1.300	Oct 2019	-		1.300	Continuing	Continuing	Continuing
Sys Eng JSF Engine Program	SS/FFP	UTC Pratt & Whitney : East Hartford, CT	48.479	29.187	Jan 2018	32.243	Jan 2019	23.224	Jan 2020	-		23.224	0.000	133.133	133.133

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Sys Eng JSF Engine Program	WR	FRC-E : Cherry Point, NC	0.003	0.201	Nov 2017	0.000		0.000		-		0.000	0.000	0.204	0.204
Sys Eng P-8A Engine Program	WR	NAWCAD : Patuxent River, MD	2.300	0.000		0.600	Oct 2018	0.600	Oct 2019	-		0.600	Continuing	Continuing	Continuing
Sys Eng Lab Fld Activity-1.0 or more	WR	NAWCAD : Patuxent River, MD	214.811	6.448	Nov 2017	4.689	Oct 2018	4.748	Oct 2019	-		4.748	Continuing	Continuing	Continuing
Sys Eng Other In-House Spt	Various	Various : Various	20.617	0.210	Nov 2017	0.220	Nov 2018	0.250	Nov 2019	-		0.250	Continuing	Continuing	Continuing
GFE*	Reqn	DES/DLA : Various	13.894	0.000		1.500	Jan 2019	1.600	Jan 2020	-		1.600	Continuing	Continuing	Continuing
Prior Year Prod Dev costs no longer funded in the FYDP	Various	Various : Various	62.882	0.000		0.000		0.000		-		0.000	0.000	62.882	-
Sys Eng H-53K Propulsion	WR	NAWCAD : Patuxent River, MD	0.000	0.000		1.700	Oct 2018	1.850	Oct 2019	-		1.850	0.000	3.550	-
Sys Eng H-53K Propulsion	SS/CPFF	General Electric : Lynn, MA	0.000	0.000		6.000	Jan 2019	6.000	Jan 2020	-		6.000	0.000	12.000	12.000
MQ-4C	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.400	Oct 2019	-		0.400	Continuing	Continuing	Continuing
MQ-4C	SS/CPFF	Rolls Royce : Indianapolis, IN	0.000	0.000		0.000		1.000	Mar 2020	-		1.000	0.000	1.000	1.000
Sys Eng UAV Engine Program	SS/FFP	Bell-Boeing : Bingen, WA	0.000	0.000		0.000		0.400	Mar 2020	-		0.400	0.000	0.400	0.400
Sys Eng UAV Engine Program	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.000		0.250	Oct 2019	-		0.250	Continuing	Continuing	Continuing
		Subtotal	1,127.570	91.377		104.669		98.812		-		98.812	Continuing	Continuing	N/A

Remarks

GFE includes expected cost of fuel necessary to support engine development and qualification testing.
Total may be off due to rounding.

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Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	Various	Various : Various	8.300	0.000		0.100	Oct 2018	0.100	Oct 2019	-		0.100	Continuing	Continuing	Continuing
Development Support	WR	FRC-SW : North Island, CA	0.823	0.000		0.000		0.000		-		0.000	0.000	0.823	-
Development Support	WR	FRC-E : Cherry Point, NC	0.455	0.000		0.000		0.000		-		0.000	0.000	0.455	-
Development Support	WR	NSWC : Crane, IN	0.160	0.100	Nov 2017	0.200	Oct 2018	0.200	Oct 2019	-		0.200	0.000	0.660	-
		Subtotal	9.738	0.100		0.300		0.300		-		0.300	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test & Evaluation	Various	Various : Various	3.442	0.000		0.100	Oct 2018	0.100	Oct 2019	-		0.100	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NSWC : Crane, IN	0.548	0.000		0.100	Oct 2018	0.100	Oct 2019	-		0.100	Continuing	Continuing	Continuing
		Subtotal	3.990	0.000		0.200		0.200		-		0.200	Continuing	Continuing	N/A

Management Services ($ in Millions)

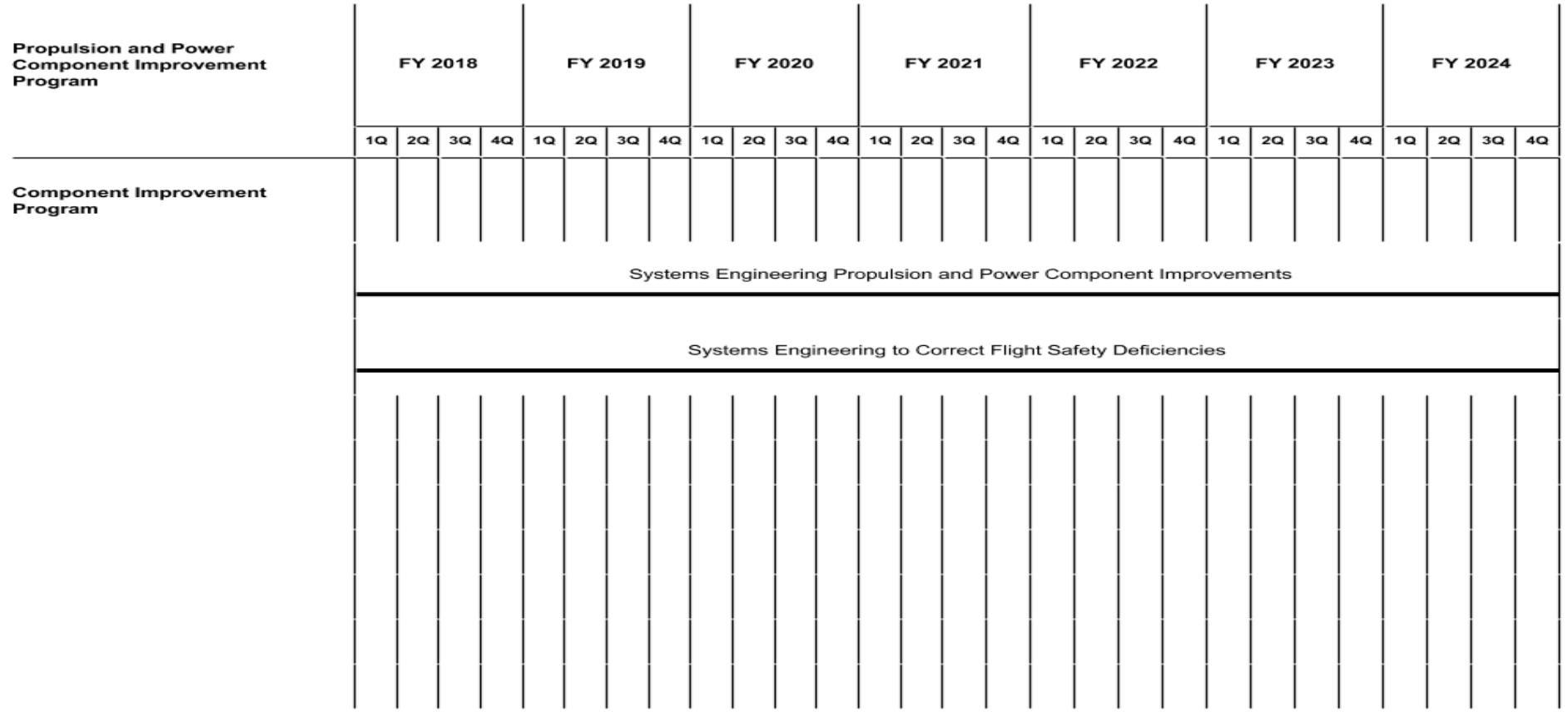
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Various	NAVAIR : Patuxent River, MD	0.781	0.051	Oct 2017	0.054	Oct 2018	0.060	Oct 2019	-		0.060	Continuing	Continuing	Continuing
Prior Year Mgmt cost no longer funded in the FYDP	Various	Various : Various	1.447	0.000		0.000		0.000		-		0.000	0.000	1.447	-
		Subtotal	2.228	0.051		0.054		0.060		-		0.060	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 1355 / *Propulsion and Power Component Improvement Program*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,143.526	91.528		105.223		99.372		-		99.372	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*



2020DON - 0205633N - 1355

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 1355 / *Propulsion and Power Component Improvement Program*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Propulsion and Power Component Improvement Program				
Component Improvement Program: Engine Improvements	1	2018	4	2024
Component Improvement Program: Power & Propulsion	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 2269 / *Expeditionary Airfield Improvements*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2269: *Expeditionary Airfield Improvements*	56.580	12.139	1.611	2.068	-	2.068	0.841	0.000	0.000	0.000	0.000	73.239
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Expeditionary Airfields (EAF) program designs, develops and tests a Sustainment Lighting System (SLS); specifically the LED CAT I Instrumented Flight Rules (IFR)/Visual Flight Rules (VFR) Approach Light System, to replace the obsolete legacy EAF lighting system. This system will support EAF Marine Aircraft Wing Support Squadrons with the required EAF Approach Light System equipment to install Forward Operating Bases and Forward Arming and Refueling Points. With the deployment of this equipment, the Marine Aircraft Wing Support Squadrons can support all United States Marine Corps (USMC) aircraft allowing the Combatant Commanders the flexibility to deploy Aircraft Combat Elements to meet anticipated threats.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Expeditionary Airfield Improvements	12.139	1.611	2.068	0.000	2.068
Articles:	-	-	-	-	-
Description: The EAF program designs, develops and tests a Sustainment Lighting System (SLS); specifically the LED CAT I Instrumented Flight Rules (IFR)/Visual Flight Rules (VFR) Approach Light System, to replace the obsolete legacy EAF lighting system. This system This system will provide EAF Marine Aircraft Wing Support Squadrons with the required EAF equipment to install Forward Operating Bases and Forward Arming and Refueling Points. With the deployment of this equipment the Marine Aircraft Wing Support Squadron can support all USMC aircraft allowing the Combatant Commanders the flexibility to deploy Aircraft Combat Elements to meet anticipated threats. This system will provide EAF Marine Aircraft Wing support Squadrons.					
FY 2019 Plans: Continue systems engineering efforts in support of the Sustainment Lighting System (SLS). Continue the design, development, and integration of the SLS program. Conduct Critical Design Review (CDR), Test Readiness Review (TRR), begin Developmental Testing (DT) and Integration/Operational Testing.					
FY 2020 Base Plans: Continue systems engineering efforts in support of the Sustainment Lighting System (SLS). Complete Developmental Testing (DT) and Integration/Operational Testing and conduct Production Readiness Review (PRR)					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 2269 / *Expeditionary Airfield Improvements*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase from FY2019 to FY2020 is to continue Systems Engineering in support of the production readiness review.					
Accomplishments/Planned Programs Subtotals	12.139	1.611	2.068	0.000	2.068

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/4213: *ASE-Expeditionary Airfields*	4.450	8.484	12.474	13.420	25.894	8.698	8.864	9.044	9.225	Continuing	Continuing

Remarks

OPN 4213 includes a portion of line item funding for Expeditionary Airfields.

D. Acquisition Strategy

Expeditionary Airfields (EAF) Sustainment Lighting System was initially an ACAT III program. As a result of the re-scope it has been re-designated as an ACAT IV M program in January 2018. The program is focused on a combination of a required capability to conduct operations in an expeditionary environment and the industrial base for airfield lighting.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 2269 / *Expeditionary Airfield Improvements*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWCAD : Lakehurst, NJ	23.980	9.561	Nov 2017	0.497	Jan 2019	1.402	Nov 2019	-		1.402	0.524	35.964	-
Prior year Prod Dev no longer funded in the FYDP	Various	Various : Various	22.016	0.000		0.000		0.000		-		0.000	0.000	22.016	-
		Subtotal	45.996	9.561		0.497		1.402		-		1.402	0.524	57.980	N/A

Remarks

The increase from FY2019 to FY2020 is to continue Systems Engineering in support of the Production Readiness Review (PRR).

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics	WR	NAWCAD : Lakehurst, NJ	2.615	0.600	Nov 2017	0.297	Jan 2019	0.455	Nov 2019	-		0.455	0.300	4.267	-
Prior Year Support no longer funded in the FYDP	Various	Various : Various	3.637	0.000		0.000		0.000		-		0.000	0.000	3.637	-
		Subtotal	6.252	0.600		0.297		0.455		-		0.455	0.300	7.904	N/A

Remarks

The increase from FY2019 to FY2020 is to support logistics efforts for the Production Readiness Review (PRR)

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	WR	NAWCAD : Lakehurst, NJ	2.726	1.750	Nov 2017	0.568	Jan 2019	0.116	Nov 2019	-		0.116	0.000	5.160	-
Opeval Test Support	WR	COMOPTEVFOR : Norfolk, VA	0.239	0.000		0.166	Apr 2019	0.053	Nov 2019	-		0.053	0.000	0.458	-
		Subtotal	2.965	1.750		0.734		0.169		-		0.169	0.000	5.618	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 2269 / *Expeditionary Airfield Improvements*	

Management Services ($ in Millions)

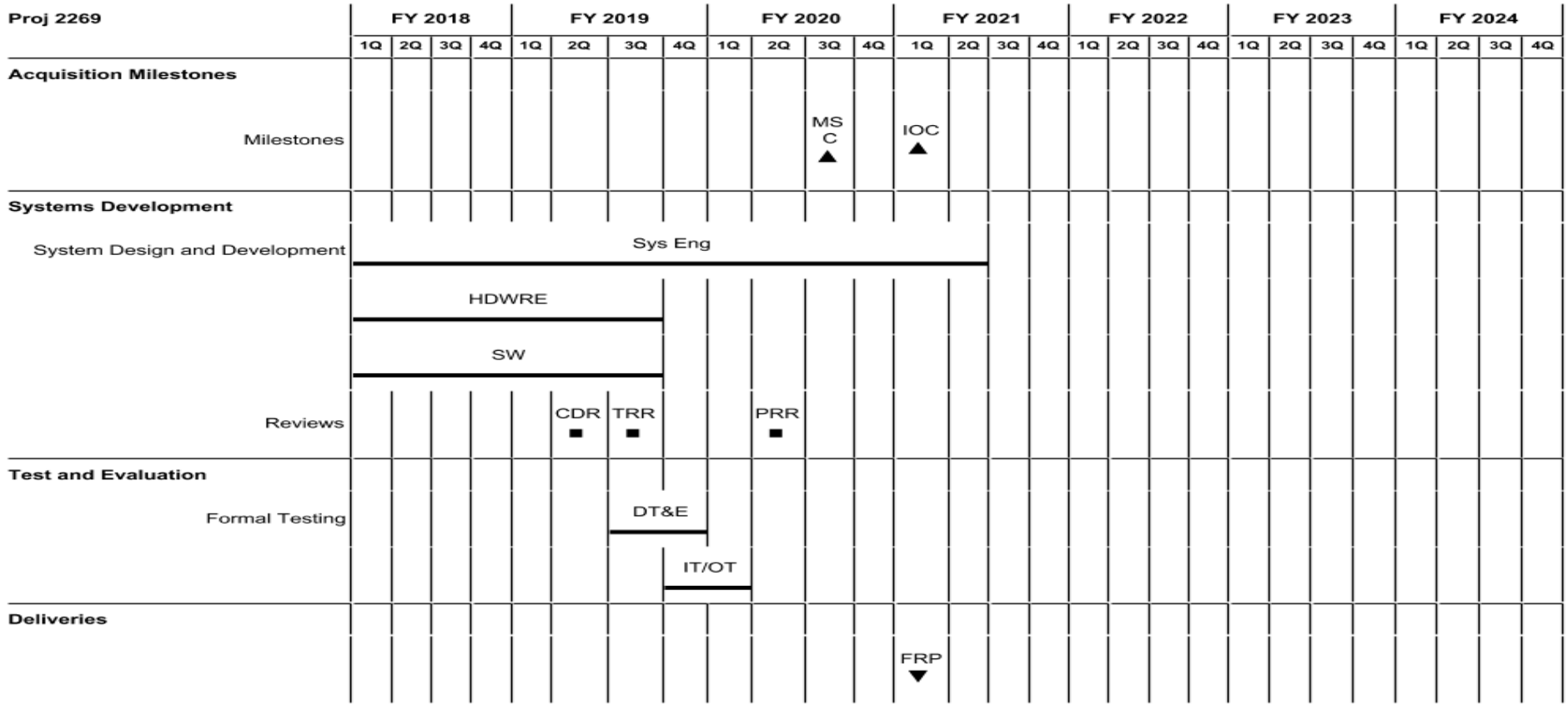
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Support Services	C/CPFF	Various : Various	1.367	0.228	Dec 2017	0.083	Dec 2018	0.042	Dec 2019	-		0.042	0.017	1.737	1.737
		Subtotal	1.367	0.228		0.083		0.042		-		0.042	0.017	1.737	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	56.580	12.139		1.611		2.068		-		2.068	0.841	73.239	N/A

Remarks

Prior Year includes $4.9 million of Congressional Add funding.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 2269 / *Expeditionary Airfield Improvements*



2020DON - 0205633N - 2269

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 2269 / *Expeditionary Airfield Improvements*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2269				
Acquisition Milestones: Milestones: Milestone C	3	2020	3	2020
Acquisition Milestones: Milestones: IOC	1	2021	1	2021
Systems Development: System Design and Development: Systems Engineering	1	2018	2	2021
Systems Development: System Design and Development: Hardware Development	1	2018	3	2019
Systems Development: System Design and Development: Software Development	1	2018	3	2019
Systems Development: Reviews: Critical Design Review	2	2019	2	2019
Systems Development: Reviews: Test Readiness Review	3	2019	3	2019
Systems Development: Reviews: Production Readiness Review	2	2020	2	2020
Test and Evaluation: Formal Testing: Tech Eval/Dev T&E	3	2019	4	2019
Test and Evaluation: Formal Testing: IntegrationTesting/Operational Testing	4	2019	1	2020
Deliveries: Delivery: Lot 1	1	2021	1	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	4.828	15.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.828
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funding will support F/A-18 E/F and E/A-18G Engine Enhancements, Technology Maturation and Risk Reduction planning and analysis.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Program Increase ***FY 2018 Accomplishments:*** Congressional Add ***FY 2019 Plans:*** N/A	4.828	0.000
Congressional Add: F/A-18 E/F and E/A-18G Engine Enhancements ***FY 2018 Accomplishments:*** N/A ***FY 2019 Plans:*** Funding will support F/A-18 E/F and E/A-18G Engine Enhancements, Technology Maturation and Risk Reduction planning and analysis.	0.000	15.000
Congressional Adds Subtotals	4.828	15.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not required for congressional adds

E. Performance Metrics

Not required for congressional adds

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205633N / *Aviation Improvements*	Project (Number/Name) 9999 / *Congressional Adds*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPFF	Various : Various	0.000	0.000		12.000	Feb 2019	0.000		-		0.000	0.000	12.000	12.000
		Subtotal	0.000	0.000		12.000		0.000		-		0.000	0.000	12.000	N/A

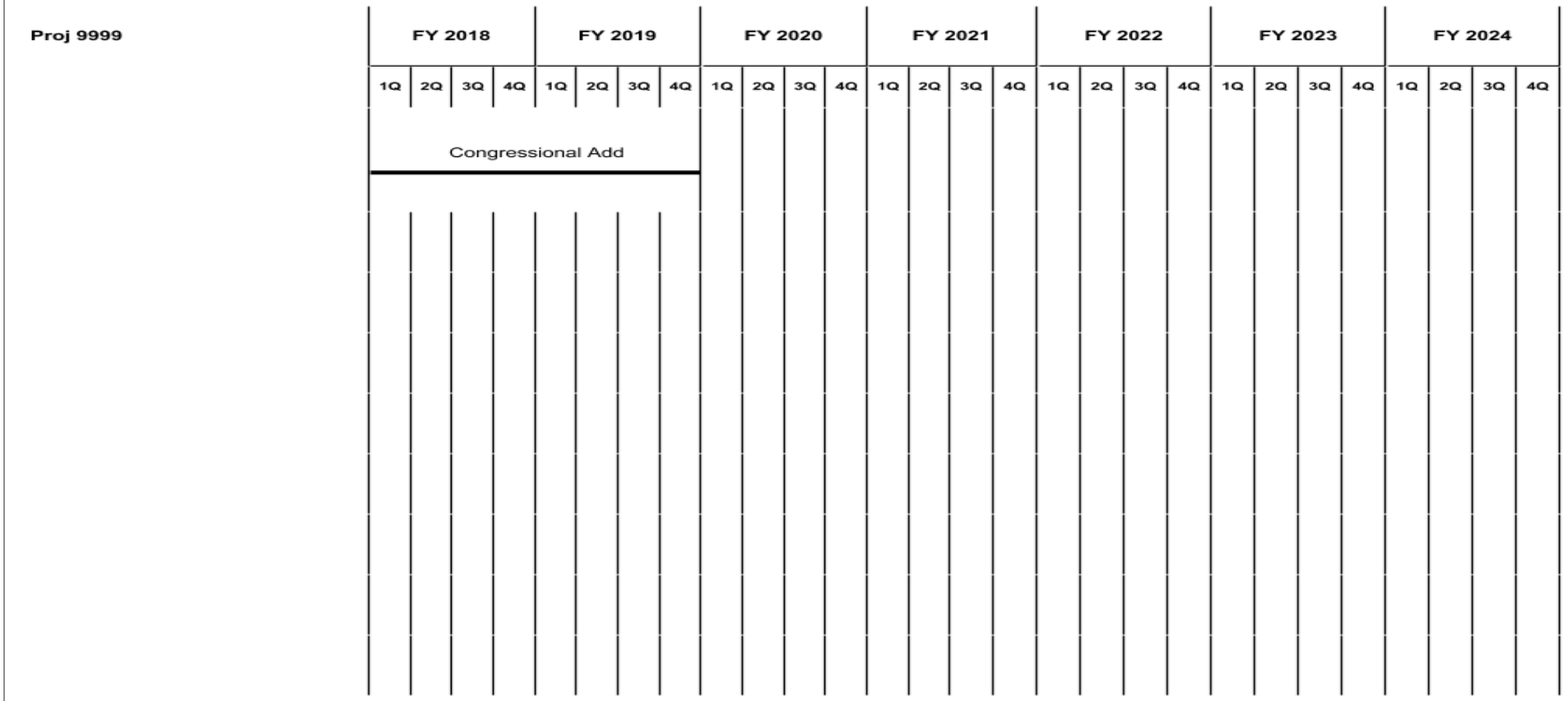
Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support	WR	NAWCAD : Patuxent River, MD	0.000	4.828	Jul 2018	3.000	Dec 2018	0.000		-		0.000	0.000	7.828	-
		Subtotal	0.000	4.828		3.000		0.000		-		0.000	0.000	7.828	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	4.828		15.000		0.000		-		0.000	0.000	19.828	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 9999 / *Congressional Adds*



2020PB - 0205633N - 9999

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205633N / *Aviation Improvements*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Congressional Add	1	2018	4	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0206313M *I Marine Corps Comms Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	1,528.475	170.529	188.813	143.317	15.000	158.317	116.043	87.659	120.011	120.754	Continuing	Continuing
2270: *Exp Indirect Fire Gen Supt Wpn Sys*	279.659	30.122	19.553	29.620	-	29.620	20.704	21.011	23.206	27.460	Continuing	Continuing
2273: *Air Ops Cmd & Control (C2) Sys*	437.381	11.130	8.467	5.397	-	5.397	6.685	7.660	5.913	6.000	Continuing	Continuing
2274: *Command & Control Warfare Sys*	45.162	8.087	11.992	10.454	-	10.454	11.698	12.360	27.399	22.547	Continuing	Continuing
2275: *Marine Corps Tactical Radio Systems*	60.097	20.994	23.288	13.348	-	13.348	15.176	14.604	17.551	17.892	Continuing	Continuing
2276: *Comms Switching and Control Sys*	44.494	2.068	1.675	1.778	-	1.778	1.815	1.653	1.686	1.719	Continuing	Continuing
2277: *System Engineering and Integration*	48.106	6.732	4.263	5.071	-	5.071	5.530	5.429	5.133	5.235	Continuing	Continuing
2278: *Air Defense Weapons System*	91.427	28.794	89.735	49.535	15.000	64.535	36.523	12.351	26.052	26.570	Continuing	Continuing
2510: *MAGTF CSSE & SE*	300.033	1.123	1.307	1.814	-	1.814	0.962	0.972	0.991	1.010	Continuing	Continuing
3099: *Radar System*	192.155	9.520	16.435	13.708	-	13.708	5.651	1.462	1.498	1.528	Continuing	Continuing
3772: *Information Related Capabilities (IRC)*	0.000	0.000	4.188	4.791	-	4.791	3.310	2.002	2.261	2.306	Continuing	Continuing
3773: *Fire Coordination and Sensors*	0.000	0.000	7.910	7.801	-	7.801	7.989	8.155	8.321	8.487	Continuing	Continuing
9999: *Congressional Adds*	29.961	51.959	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	81.920

A. Mission Description and Budget Item Justification

This program element provides funding to develop the command and control (C2) support and information infrastructures for the Fleet Marine Force and supporting establishment. Doctrinally, the C2 support system and the information infrastructure form two parts of a triad of capabilities which permits command and control systems to be transformed into a complete operating system. The third element of the triad is command and control organization and is not covered in this program element. USMC command and control is divided into seven functional areas and one supporting functional area as follows: intelligence C2, fire support C2, air operations C2, radio systems C2, combat service support C2, warfare C2, radar systems C2, and C2 support (information processing and communications).

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0206313M *I Marine Corps Comms Systems*

Within this program element, subprojects have been grouped by C2 functional area for more efficient planning. Air defense weapons systems have been added to facilitate planning and a separate project is used for systems assigned to the supporting establishment. Subprojects which support the Commander's decision processes have been collected into the Command Post Systems project since these systems must work in close cooperation to ensure effective C2 of Marine Air Ground Task Forces.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	123.825	174.779	148.367	-	148.367
Current President's Budget	170.529	188.813	143.317	15.000	158.317
Total Adjustments	46.704	14.034	-5.050	15.000	9.950
• Congressional General Reductions	-	-0.568			
• Congressional Directed Reductions	-	-1.528			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.405	0.000			
• SBIR/STTR Transfer	-4.098	0.000			
• Program Adjustments	0.000	32.260	9.735	-	9.735
• Rate/Misc Adjustments	0.002	-16.130	-14.785	15.000	0.215
• Congressional General Reductions Adjustments	-0.327	-	-	-	-
• Congressional Directed Reductions Adjustments	-5.083	-	-	-	-
• Congressional Add Adjustments	53.805	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *Radar System Development*	12.554	0.000
Congressional Add: *FOB Protection - Counter-UAS*	39.405	0.000
Congressional Add Subtotals for Project: 9999	51.959	0.000
Congressional Add Totals for all Projects	51.959	0.000

Change Summary Explanation

The FY 2020 funding request was reduced by $4.00M to account for the availability of prior year execution balances.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0206313M *I Marine Corps Comms Systems*

The net decrease of $30.496M between FY19 and FY20 is primarily due to the following major program adjustments within the PE:

1) Expeditionary Indirect Fire Gen Supt Weapon Sys funding increase of $10.067M from FY19 to FY20 to support continued development, design, test, and integration of emerging capabilities across the Handheld Command and Control (H2C2) Family of Systems (FoS).

2) Tactical Radio Systems decrease of $9.940M from FY19 to FY20 reflects transition of NOTM variants from initial design, development, and prototyping to technology refresh cycles. Decrease also reflects completion of VSAT-M Refresh test asset procurement and 80% of testing events as well as the completion of Terrestrial Wideband Transmission System (TWTS) engineering support.

3) Air Defense Weapons System decrease of $25.200M from FY19 to FY20 (Base and OCO), Ground Based Air Defense (GBAD) Increment I, also known as Marine Integrated Air Defense System (MADIS), is due to the migration from research and development to production efforts following Milestone C decision in 1QFY20.

4) Air Operation Command and Control (C2) System funding decrease of $3.070M from FY19 to FY20 reflects reduction in Theater Battle Management Core System (TBMCS) software development support requirements.

5) Radar Systems decrease of $2.727M from FY19 to FY20 reflects USMC decision to defer all modernization except the IFF Mode 5/S level 1 upgrade and upgrades specifically to prevent system obsolescence such as the Digital Receive Exciter efforts.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*				Project (Number/Name) 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2270: *Exp Indirect Fire Gen Supt Wpn Sys*	279.659	30.122	19.553	29.620	-	29.620	20.704	21.011	23.206	27.460	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, AFATDS FoS and THS funding has been realigned from project 2270, Command Post Systems. Beginning in FY19, FTAS funding has been realigned from project 3099 Radar Systems. Realignment of efforts to new projects in FY19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

Marine Air Ground Task Force (MAGTF) Command and Control (C2) Systems (MAGTF C2)- MAGTF C2 Tactical Service Oriented Architecture (TSOA) is an ACAT IV(M) program of record (POR) that is the Marine Corps' response to the Department of Defense (DoD) Net-Centric Services Strategy (NCSS). TSOA is a software only "IT-Box" program that was created in order to achieve agility and greater cost reduction across the USMC Command and Control (C2) Enterprise. This POR has been identified by the USMC Combat Development and Integration (CD&I) as the USMC's Service Oriented Infrastructure (SOI), which is equivalent to a Common Operating Environment (COE). The USMC seeks to rectify its current C2 architecture, which is composed of disparate and duplicative legacy systems through TSOA. TSOA will enable a collapse of this disparate C2 construct and create a Net-centric environment where Marines employ user-centered applications that access required information across Authoritative Data Sources (ADS). This will be achieved through the CD&I-directed TSOA compliance effort in order to reduce duplicative product development and enable a divestiture of legacy disparate systems. This requires additional effort to ensure other ADSs are compliant with the TSOA product line.
TSOA's purpose is to ensure that Marines receive the right information, from trusted and accurate sources, when and where it is needed. This enables decisions "in context" for USMC operations across the Range of Military Operations and in support of the Unified Command Plan. TSOA's four capabilities include: Infrastructure and Services (I&S) which is the capability of authorized users to subscribe and publish required information from ADS with the use of software connectors; Agile Application Development (A2D) which is the capability to develop, accredit, and provide easy-to-learn, user-defined software applications that meet emergent Marine needs; Modular Software Architecture (MSA) which is virtualized, hardware agnostic, and scalable; Marine Corps Software Resource Center (MCSRC) is the Marine Corps' enterprise "App Store" for developed applications that allows Marines the ability to download, review, rate, and provide feedback. TSOA's RDTEN funding increased by $3.819M between FY19 and FY20 for three reasons. First, TSOA will be upgraded to enable being hosted on emerging Tactical Cloud environments. Second, TSOA will add additional TDS platforms (e.g., Networking on The Move, Combat Data Network) which will be capable of hosting the SOI. Third, in conjunction with the Office of Naval Research (ONR), TSOA will initiate Artificial Intelligence (AI)/Neural Network (NN) capabilities resulting in a Cognitive Assistant in support of course of action (COA) decision making.

Joint Battle Command - Platform (JBC-P) Family of Systems (FoS) - JBC-P FoS is an Army led ACAT II program of Joint Requirements Oversight Council (JROC) interest, formerly known as the Blue Force Tracker (BFT) FoS. It is comprised of L-Band SATCOM and is a digital, battle command information FoS that provides integrated, on the move, timely, relevant Command and Control Situational Awareness (C2SA) information to tactical combat, combat support and combat service

support commanders, leaders, and key C2 nodes. JBC-P FoS will provide JROC mandated C2SA convergence across Combat Operations Centers (COC), ground vehicles and dismounted personnel.

Identity Dominance System-MC (IDS-MC) - IDS-MC is a multi-modal (fingerprint, iris, and face) biometric collection system that provides the USMC a reliable and effective capability to collect, share, match, access, verify and store identity information. IDS-MC will enable the Marine to collect appropriate biometric, biographical and reference information on an individual and match this locally developed information with pre-existing information available to the expeditionary force. The system will display match results with linkage to the respective individual's biographical and reference information as well as help analyze the response, update records as appropriate, create reports and disseminate updated information. The primary mission of IDS-MC is to provide the Marine Corps with the means to identify persons encountered in the battle space. While IDS-MC is not an intelligence analysis system, it does provide identification information in support of military intelligence and law enforcement operations by providing positive identification of persons of interest. IDS-MC is an enabler in the areas of detainee management and questioning, base access, counterintelligence screening, border control, law enforcement, displaced persons' management and aiding in humanitarian assistance missions. IDS-MC supports the tactical application of identity dominance and fully supports a forward presence, crisis response and contingency response capability.

The Expeditionary Forensics and Exploitation Capability (EFEC) provides tactical and operational level forensic technical exploitation capabilities required by Marine Corps forward deployed forces. EFEC provides organic Marine Corps forensic capabilities that support the tactical commander with agile, ruggedized, and scalable expeditionary forensic capabilities that are compatible and fully integrated with joint, other Service, and interagency laboratories, yet also tailored to the unique operating requirements of the maritime domain. Maritime applications include the ability to support Marine Expeditionary Units and ruggedized construction for deployment of sensitive forensic testing and analysis equipment. Through the ability to recognize, protect, collect, analyze, store and share items with forensic value, EFEC positively identifies personnel and trace chemicals/elements; forensically exploits document and media in the commander's area of operation; and scientifically links identities and networks to places, events, and activities. It is a critical enabler to force protection, Counter Improvised Explosive Device, intelligence, targeting and law enforcement operations.

Handheld Command and Control (H2C2) - The H2C2 portfolio consists of two specific capabilities - secure wireless access to multiple networks and handheld communication platforms. The handheld capability provides low cost (commercially available) platforms (smartphones and tablets) for use on tactical networks, up to SECRET, regardless of the operational environment. The secure wireless capability enables Marines burdened by wired implementations an option to leverage wireless mediums. This capability provides wireless communication between a variety of devices. Changes in SW development and testing requirements resulted in additional resources required to complete tasks. Ongoing H2C2 source selection efforts resulted contract award for Sample H2C2 equipment and DT Hardware moving from FY18 to FY19.

Global Command and Control System Tactical Combat Operations (GCCS TCO)- The GCCS TCO program is the principal tool within the MAGTF for situational awareness through distribution of the Common Tactical Picture (CTP). It supports tactical operations providing information via high speed computer systems in a timely manner and includes the Tactical COP Workstation/Servers. RDT&E funding allows for developmental software development as the program of record changes from a client/server relationship to a cloud based enterprise solution.

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The overall increase of $10.067M is principally due to TSOA compliance efforts for MAGTF C2, initial software development support services for GCSS TOS, and the development and certification of software for H2C2.

Advanced Field Artillery Tactical Data Family of Systems (AFATDS FoS) - AFATDS FoS consists of three programs, AFATDS, Back Up Computer System (BUCS) and Mobile Tactical Shelter (MTS). The AFATDS automates the fire planning, tactical fire direction, and fire support coordination required to support maneuver from the sea and subsequent operations ashore. AFATDS integrates all supporting arms assets within the MAGTF such as mortars, cannon artillery, rockets and missiles, close air support, and naval surface fire support systems. BUCS is a hand-held computer system designed to provide a backup to the AFATDS in computing ballistic firing solutions, as well as provide survey and Meteorological functions in support of artillery. Additionally BUCS is the primary ballistic firing solution system during Ship To Objective Maneuver (STOM) and for the Expeditionary Fire Support System (EFSS). The MTS is a Lightweight Multi-purpose Shelter mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV) which protects both the AFATDS and operators from the environment. MTS enables rapid emplacement and displacement of fire support elements and provides networked communications on the move. Realignment of effort to new Project (C3773) in FY 19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

Target Hand-Off System (THS) - The THS addressed a Marine Corps operational requirement for a lightweight, handheld, and accurate target acquisition engagement coordination system. THS provides MAGTF Commanders with the only man-portable target location capability that allows Air Officers and Fire Support Coordinators to prosecute identified targets. The THS' advance interoperability capability provides the MAGTF Commander with the only portable target acquisition system able to interoperate with all target prosecution platforms available in the battlefield. The THS is designed for the Forward Air Controllers (FACs), Forward Observers (FOs), Fire Support Teams (FSTs), Firepower Control Teams (FCTs), Tactical Air Control Parties (TACPs) and Reconnaissance Teams to quickly acquire targets in day, night and near-all-weather visibility conditions, in order to conduct precise, rapid indirect surface fire support, Naval Surface Fire Support (NSFS) and Close Air Support (CAS). FY19 increase is due to a realignment from PROJECT C2270 to PROJECT C3773. Realignment of effort to new Project in FY 19 and beyond reflects USMC Program Management Office (PMO)reorganization to improve support of USMC OPFOR.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MAGTF C2: Product Development	7.133	10.022	12.869	0.000	12.869
Articles:	-	-	-	-	-
FY 2019 Plans: -Complete the addition of Authoritative Data Sources from Intelligence, Logistics and Operations to the TSOA in order to meet identified Marine Corps gaps. -Complete the improvement and enhancement of MAGTF interoperability using the service oriented architecture provided by the TSOA. -Complete development of applications for the Marine Corps Software Resource Center to enable more effective information sharing and the ability for Marines to make more informed and timely decisions.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Complete the research and development for the deployment of the TSOA to additional Marine Corps platforms (NOTM and MCEITS). ***FY 2020 Base Plans:*** -Will initiate and complete the release of new logistics applications and intelligence connectors. -Will initiate harvested cloud data which enables higher fidelity Machine Learning models. This will enable future Cognitive Assistants. -Will initiate MCSRC support for USMC Common Handheld devices for lightweight applications. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in the amount of $2.847M from FY19 to FY20 is driven by the CD&I mandated TSOA compliance utilizing automated test harnesses and the initiation of hosting TSOA on multiple Tactical Cloud environments (e.g., USMC deployed, U.S. Navy). This will enable Marines to fight as they train using tactical applications in both garrison and deployed environments.					
Title: MAGTF C2: Support Costs ***Articles:*** ***FY 2019 Plans:*** - Continue system engineering support for system integration, configuration management, and technical assessments. ***FY 2020 Base Plans:*** -Will continue system engineering support for system integration, configuration management, and technical assessments of software products. ***FY 2020 OCO Plans:*** N/A	1.369 -	1.387 -	1.387 -	0.000 -	1.387 -
Title: MAGTF C2: Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** -Continue to participate in technical working groups in support of test and engineering.	1.659 -	1.057 -	2.081 -	0.000 -	2.081 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Continue to provide technical assistance to other programs supported by Marine Corps Tactical Systems Support Activity (MCTSSA) that involve the use of these systems as well as through the Operating forces Tactical Systems Support Center (OFTSSC) trouble calls. ***FY 2020 Base Plans:*** -Will initiate TSOA compliance testing with USMC Tactical Data Systems (TDS). -Will continue to participate in technical working groups in support of test and engineering. -Will continue to provide technical assistance to other programs supported by Marine Corps Tactical Systems Support Activity (MCTSSA) that involve the use of these systems as well as through the Operating Forces Tactical Systems Support Center (OFTSSC) trouble calls ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $1.024M from FY19 to FY20 reflects the initiation of testing of TSOA Compliance with USMC Tactical Data Systems.					
Title: MAGTF C2: Management Services ***Articles:*** ***FY 2019 Plans:*** -Continue to receive software engineering support to provide appropriate government direction in design and development of software, conduct of source code reviews and prime vendor oversight from Federally Funded Research and Development Center (FFRDC). ***FY 2020 Base Plans:*** -Will continue to receive software engineering support to provide appropriate government direction in design and development of software, conduct of source code reviews, and prime vendor oversight from Federally Funded Research and Development Center (FFRDC). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020	1.301 -	1.296 -	1.296 -	0.000 -	1.296 -
Title: AFATDS: Software Development and Integration	3.603	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: - See Project 3773. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: AFATDS: Test and Evaluation	0.305	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: - See Project 3773. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: AFATDS: Management Services	0.650	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: - See Project 3773. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: THS: Product Development	1.629	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
See Project 3773. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: EFEC: Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** -Initiate coordination with government labs and industry for product testing and integration of Commercial Off-the-Shelf (COTS) capabilities for the EFEC system design. ***FY 2020 Base Plans:*** -Continue coordination with the government labs and industry for product testing and integration of Commercial Off-the-Shelf (COTS) capabilities for the EFEC system design. -Initiate User Assessments in support of EFEC MS C/FRP. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** $0.15M increase in FY20 to support performance testing and user assessments in preparation for a MS C/FRP in FY21.	0.000 -	0.400 -	0.550 -	0.000 -	0.550 -
Title: IDS-MC: Support ***Articles:*** ***FY 2019 Plans:*** -Continue to develop, assess, and integrate technologies for the IDS-MC Increment 2 integrated system design. ***FY 2020 Base Plans:*** - Initiate software engineering support. - Initiate laboratory integration to facilitate test and network integration cybersecurity updates, to include Technical Readiness Reviews and software patching.	0.847 -	0.976 -	0.987 -	0.000 -	0.987 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiate Market Research for IDS-MC Increment 3 technical refresh. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.					
Title: JBC-P: Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** -Continue laboratories integration to facilitate test and network integration test events. ***FY 2020 Base Plans:*** -Will continue laboratory integration to facilitate network integration and test events in support of mounted and dismounted interoperability. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.256M is due to interoperability test requirements between dismounted C2SA equipment and mounted JBCP equipment.	0.523 -	0.035 -	0.291 -	0.000 -	0.291 -
Title: JBC-P: Software and Product Development/Integration ***Articles:*** ***FY 2019 Plans:*** -Continue coordination with the software and product development teams to assist in the development and integration of the JBC-P software capability and associated testing. -Continue software engineering support to provide appropriate government direction in design and development of software. ***FY 2020 Base Plans:*** -Will continue laboratory integration to facilitate network integration and test events in support of mounted and dismounted interoperability. ***FY 2020 OCO Plans:***	0.493 -	0.000 -	0.588 -	0.000 -	0.588 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.588M supports mounted and dismounted interoperability and integration.					
Title: GCCS TCO: Product Development	0.000	0.000	2.000	0.000	2.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** -Will initiate software development support services for a modernization transition from a client/server relationship to a cloud based enterprise solution. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $2.0M between FY19 and FY20 funds initial software development support services for a modernization transition from a client/server relationship to a cloud based enterprise solution.					
Title: H2C2: Test and Evaluation	9.622	4.238	3.285	0.000	3.285
Articles:	-	-	-	-	-
FY 2019 Plans: -Award MCH Hardware contract which includes Sample hardware required to complete software testing, hardware testing and integration testing. -Complete software qualification test events 3-5. -Complete critical release/Block 1 software testing. -Continue RMF process, initiating and conducting cyber security testing throughout all planned test events in support of accreditation process. -Complete DT Hardware testing. -Continue integration testing between MCH hardware and software. -Continue interoperability testing between MCH system and JBC-P and other C2 systems. -Continue JTIC testing ***FY 2020 Base Plans:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Initiate Operational Test of Handheld end user devices, software application, peripheral equipment and integration into C2 programs of record, specifically JBC-P, JTCW and AFATDS. -Complete RMF process and cybersecurity testing in support of accreditation. -Continue interoperability testing between MCH system and JBC-P and other C2 systems. -Complete JTIC testing -Complete integration testing between MCH hardware and software. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.953M in FY20 is due to Hardware/software integration testing requirements and operational test requirements for the MCH system in FY20.					
Title: H2C2: Integration Engineering Support	0.988	0.142	4.286	0.000	4.286
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue to provide support for sustained engagement with various industry providers, quick look technology excursions, and experimentation demonstrations for high risk emerging technology. -Continue efforts for software and hardware integration to attain NSA Commercial Solutions for Classified (CSfC) approved capability package in support accreditation and testing. -Continue to support development of Operational Architecture for the H2C2 program, required to support completion of OT and JTIC events. ***FY 2020 Base Plans:*** -Develop, design, and integrate emerging capabilities across the H2C2 portfolio to include: MAGTF Common Handheld end user device, software application, peripheral equipment and integration with existing C2 programs of record. Complete support development of Operational Architecture for the H2C2 program, required to support completion of OT and JTIC events. -Provide support for sustained engagement with various industry providers, quick look technology excursions and experimentation demonstrations for high risk emerging technology, to include emergent CSfC components and Type 1 encryption technologies.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Complete software and hardware engineering integration efforts for NSA CSfC approved capability packages in support of integration tests. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $4.144M from FY19 to FY20 funds the ongoing development, and certification of software to include code analysis, and cybersecurity engineering required to incorporate emerging technologies to counter emerging threats and maintain Authority to Operate (ATO).					
Accomplishments/Planned Programs Subtotals	30.122	19.553	29.620	0.000	29.620

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4631DD: *AFATDS*	10.199	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	39.218
• PMC/4631FF: *JBC-P*	41.678	17.056	8.159	-	8.159	8.334	8.490	8.700	8.874	Continuing	Continuing
• PMC/4631GG: *THS*	17.985	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	28.775
• RDTE/C3773A: *AFATDS*	0.000	5.391	5.763	-	5.763	5.911	6.042	6.165	6.288	Continuing	Continuing
• PMC/4652AA: *IDS-MC*	0.000	0.971	4.945	-	4.945	1.007	0.000	0.000	0.000	Continuing	Continuing
• RDTE/C3773B: *THS*	0.000	0.678	0.409	-	0.409	0.418	0.426	0.435	0.444	Continuing	Continuing
• PMC/4733AA: *THS*	0.000	24.739	2.439	-	2.439	2.487	2.537	2.588	2.640	Continuing	Continuing
• PMC/4733BB: *AFATDS*	0.000	12.521	12.852	-	12.852	15.531	15.908	16.245	16.570	Continuing	Continuing
• PMC/4652BB: *EFEC*	0.750	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.750
• PMC/4631EE: *GCCS TCO*	0.689	0.380	1.409	-	1.409	9.499	0.096	0.098	0.100	Continuing	Continuing
• PMC/LI4631: *H2C2*	0.000	0.000	11.516	-	11.516	0.000	0.000	0.000	0.000	0.000	11.516

Remarks

D. Acquisition Strategy

MAGTF C2 (TSOA): TSOA program office has developed its Acquisition Strategy/Acquisition Plan (ASAP) to define the TSOA operational mission, business strategy and the detailed acquisition approach relative to cost, schedule and performance drivers. The TSOA program is being developed and managed using an "IT-Box" construct that supports agile development and requirements oversight for information systems." Requirements for TSOA are described in three key documents: the Information System Initial Capabilities Document (IS-ICD), the Requirements Definition Package (RDP), and the Capability Drop (CD).

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JBC-P: JBC-P FoS is leveraging the Army's development of the JBC-P. The Marine Corps program is contingent upon the Army's development and acquisition strategy. The Army will fund research and development for JBC-P unless there are Service unique requirements, which the Marine Corps program office will fund. The Marine Corps program office will participate in all design and readiness reviews and joint operational testing events.

Identity Dominance System (IDS): For IDS-MC Increment 1, the Program Office acquisition strategy leveraged the Navy's IDS Program and provided funding to enhance the Navy's system to meet Marine Corps requirements. The Marine Corps program office participated in all design and technical reviews as well as the FOT&E activities. For IDS-MC Increment 2, the Marine Corps Program Office is collaborating with the Army and Navy to leverage market research and technology demonstration data for system hardware and software selection in support of technical refresh. The Marine Corps plans to conduct technology assessments in FY17, conduct agile test events in FY18, MS C/FRP in FY19, and Fielding Decision(with system procurement) in FY20. and The long-term goal is to equip the Marine with a user-friendly biometric authentication technology that will be employed throughout DoD to deny the enemy freedom of movement within the populace and positively identify known insurgents within an Area of Responsibility (AOR). R&D efforts will be a combined effort with the Navy PM and the USMC for IDS Increment 2, and led by the Marine Corps Program Office.

EFEC: EFEC will use the evolutionary approach for technology insertion and enhancements. For EFEC Increment 2, the Marine Corps will conduct market research and technology demonstrations with industry to replace EFEC Increment 1 hardware and software. The acquisition of components (software/hardware) will maximize the use of existing COTS, Non-Developmental Items, and Government Furnished Equipment for the Information Technology components.

AFATDS: AFATDS is managed through Army CECOM, Aberdeen Proving Ground, MD. R&D efforts for the next AFATDS version will be a combined effort between the software developer, the Army PM, and the USMC for software enhancements through DISA. Current software enhancements are performed at Army, Ft. Sill, OK.

THS: The acquisition of components (software/hardware) for the THS initiative will maximize the use of existing COTS, Government-Off-The-Shelf (GOTS), Non-Developmental Item (NDI), and Government Furnished Equipment (GFE). Software is transitioning to a government owned baseline. Software must maintain compatibility with five Programs of Record (POR) and seven Operational Flight Programs (OFP).

H2C2: H2C2 will use an evolutionary approach for technology insertion. The approach will leverage and mature COTS and NDI technologies to rapidly transition a handheld data capability to other acquisition programs. H2C2 inserts mature technology into existing programs in order to fill capability gaps and requirement shortfalls. These technologies will be inserted at different times along gaining program acquisition cycles. This strategy will apply to available technology at different proposed technology insertion points for each gaining program. Additionally, H2C2 has been tasked to develop a solution that meets the JBC-P Dismount requirements and C2SA interoperability with existing C2 POR. Contract award for Sample H2C2 hardware planned for FY18 delayed until FY19 due to ongoing Source Selection efforts and USMC priorities.

GCCS TCO: The Program is managed by Marine Corps System Command (MCSC) internal program management, engineering, logistics and financial support. Hardware acquisition is accomplished by using MCSC Marine Corps Common Hardware Suite (MCHS) and a combination of MCHS and MCSC Command and Control Systems (C2S) contracting. Software acquisition, integration and support is provided using Space and Naval Warfare Systems Center Atlantic (SSC-A). Program

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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reutilizes Joint Staff, Defense Information Systems Agency (DISA) provided software for its functional and capability requirements and Marine Corps specific hardware for its hardware solution.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MAGTF C2	C/CPFF	SPAWAR : Charleston, SC	52.524	3.433	Apr 2018	6.658	Apr 2019	2.815	Apr 2020	-		2.815	Continuing	Continuing	Continuing
MAGTF C2	WR	NSWC : Dahlgren, VA	12.124	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MAGTF C2.	C/CPFF	SPAWAR : San Diego, CA	6.355	1.200	Jun 2018	1.000	May 2019	2.986	May 2020	-		2.986	Continuing	Continuing	Continuing
MAGTF C2	WR	SSC A : Charleston, SC	8.032	2.000	Apr 2018	1.500	Feb 2019	1.004	Feb 2020	-		1.004	Continuing	Continuing	Continuing
MAGTF C2	WR	NRL : Washington, DC	1.983	0.500	Mar 2018	0.864	Jun 2019	0.864	Jun 2020	-		0.864	Continuing	Continuing	Continuing
MAGTF C2	C/CPFF	NSWC2 : Dahlgren, VA	0.560	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MAGTF C2	C/CPFF	ARL : Penn State, PA	0.000	0.000		0.000		1.200	Apr 2020	-		1.200	0.000	1.200	-
MAGTF C2	C/CPFF	NG : San Diego, CA	0.000	0.000		0.000		4.000	Dec 2019	-		4.000	0.000	4.000	-
AFATDS	MIPR	DISA : Belleville, IL	0.964	1.890	Mar 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
AFATDS	MIPR	Army/SEC : Fort Sill, OK	1.500	1.713	Mar 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
THS	C/IDIQ	NAVSEA : Washington, DC	0.331	0.000		0.000		0.000		-		0.000	0.000	0.331	-
THS	WR	NAWC - China Lake : China Lake, CA	0.754	0.000		0.000		0.000		-		0.000	0.000	0.754	-
THS	MIPR	AMRDEC : Huntsville, AL	6.748	1.629	Mar 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
JBC-P	WR	SPAWAR : Charleston, SC	3.510	0.236	Dec 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
JBC-P	C/CPFF	SPAWAR2 : Charleston, SC	0.822	0.005	Dec 2017	0.000		0.003	Dec 2019	-		0.003	Continuing	Continuing	Continuing
JBC-P	C/CPFF	NSWC2 : Crane, IN	0.399	0.000		0.000		0.291	Dec 2019	-		0.291	Continuing	Continuing	Continuing
JBC-P	WR	DPSS : China Lake, CA	0.565	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JBC-P	WR	DPSS2 : China Lake, CA	1.382	0.000		0.000		0.000		-		0.000	0.000	1.382	-
JBC-P	C/FFP	MCTSSA : Camp Pendleton, CA	0.000	0.252	Nov 2017	0.000		0.294	Dec 2019	-		0.294	0.000	0.546	-
Prior Years Cumulative Funding	Various	Various : Various	133.461	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
GCCS TCO	C/CPFF	SPAWAR : Charleston, SC	0.000	0.000		0.000		2.000	May 2020	-		2.000	0.000	2.000	-
		Subtotal	232.014	12.858		10.022		15.457		-		15.457	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MAGTF C2	WR	SPAWAR : San Diego, CA	6.155	1.369	Feb 2018	1.387	Feb 2019	1.387	Feb 2020	-		1.387	0.000	10.298	-
H2C2 Integration Eng	WR	SPAWAR : Charleston, SC	3.484	0.000		0.000		1.053	Dec 2019	-		1.053	0.000	4.537	-
H2C2 Integration Eng	C/FFP	SPAWAR : Charleston, SC	0.664	0.000		0.000		0.578	Dec 2019	-		0.578	0.000	1.242	-
H2C2 Integration Eng	WR	NSWC Crane : Crane, IN	1.108	0.676	Nov 2017	0.000		0.732	Nov 2019	-		0.732	0.000	2.516	-
H2C2 Integration Eng	WR	NSWC China Lake : China Lake, CA	0.615	0.000		0.000		1.623	Dec 2019	-		1.623	0.000	2.238	-
H2C2 Integration Eng	C/FFP	NSWC Crane2 : Crane, IN	0.060	0.000		0.000		0.300	Oct 2019	-		0.300	Continuing	Continuing	Continuing
H2C2 Integration Eng	Various	MCSC : Stafford, VA	0.100	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
H2C2 Integration Eng	C/FFP	MITRE : Stafford, VA	0.000	0.312	Oct 2018	0.000		0.000		-		0.000	0.000	0.312	-
H2C2 Integration Eng	WR	MCTSSA : Camp Pendleton, CA	0.000	0.000		0.142	Mar 2019	0.000		-		0.000	0.000	0.142	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IDS-MC	C/FFP	MITRE : Mc Lean, Va	0.703	0.000		0.156	Nov 2018	0.000		-		0.000	0.000	0.859	-
IDS-MC	MIPR	AFRL : Wright-Paterson AFB, OH	0.000	0.760	Aug 2018	0.000		0.000		-		0.000	0.000	0.760	-
IDS-MC	WR	SPAWAR : Charleston, SC	0.556	0.087	Mar 2018	0.398	Mar 2019	0.987	Mar 2020	-		0.987	Continuing	Continuing	Continuing
IDS-MC	C/CPFF	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		0.300	Jun 2019	0.000		-		0.000	0.000	0.300	-
IDS-MC	C/BA	JITC : Fort Huachuca, AZ	0.000	0.000		0.122	Apr 2019	0.000		-		0.000	0.000	0.122	-
		Subtotal	13.445	3.204		2.505		6.660		-		6.660	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AFATDS	MIPR	Army/SEC : Ft. Sill, OK	0.000	0.305	Mar 2018	0.000		0.000		-		0.000	0.000	0.305	-
JBCP	C/FFP	NSWC Corona5 : Norco, CA	0.345	0.523	Jun 2018	0.035	Jun 2019	0.291	Jun 2020	-		0.291	0.000	1.194	-
H2C2	WR	SPAWAR1 : Charleston, SC	0.000	1.762	Dec 2017	0.000		0.000		-		0.000	0.000	1.762	-
H2C2	WR	NSWC Corona : Norco, CA	0.000	6.312	Dec 2017	0.000		0.250	Dec 2019	-		0.250	0.000	6.562	-
H2C2	C/FFP	SPAWAR2 : Charleston, SC	0.000	0.858	Dec 2017	0.000		0.500	Dec 2019	-		0.500	0.000	1.358	-
H2C2	C/FFP	NSWC Corona1 : Norco, CA	0.000	0.000	Dec 2017	0.000		0.000		-		0.000	0.000	0.000	-
H2C2	WR	NSWC China Lake : China Lake, CA	0.000	0.000	Dec 2017	0.000		0.000		-		0.000	0.000	0.000	-
H2C2	WR	MCOTEA : Quantico, VA	0.000	0.000		0.000		1.785	Dec 2019	-		1.785	0.000	1.785	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
H2C2	C/FFP	MCTSSA : Camp Pendleton, CA	0.000	0.690	Nov 2018	0.000		0.750	Dec 2019	-		0.750	0.000	1.440	-
H2C2	C/FFP	MCSC : Quantico, VA	0.000	0.000		4.238	Feb 2019	0.000		-		0.000	0.000	4.238	-
MAGTF C2	WR	NRL : Washington, DC	3.158	0.859	Feb 2018	0.500	Jun 2019	0.000		-		0.000	0.000	4.517	-
MAGTF C2	C/ FFPLOE	MCTSSA : Camp Pendleton, CA	3.491	0.800	Jan 2018	0.557	Apr 2019	2.081	Apr 2020	-		2.081	0.000	6.929	-
EFEC	WR	SPAWAR3 : Charleston, SC	0.000	0.000		0.400	Nov 2018	0.550	Nov 2019	-		0.550	0.000	0.950	-
Prior Years Cumulative Funding	Various	VARIOUS : VARIOUS	15.688	0.000		0.000		0.000		-		0.000	0.000	15.688	-
		Subtotal	22.682	12.109		5.730		6.207		-		6.207	0.000	46.728	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MAGTF C2	C/CPFF	CECOM/MITRE : Ft. Monmouth, NJ	7.527	1.301	Mar 2018	1.296	Jun 2019	1.296	Jun 2020	-		1.296	Continuing	Continuing	Continuing
AFATDS	C/CPFF	CECOM/MITRE : Ft. Monmouth, NJ	0.700	0.650	Jan 2018	0.000		0.000		-		0.000	0.000	1.350	-
Prior Years Cumulative Funding	Various	Various : Various	3.291	0.000		0.000		0.000		-		0.000	0.000	3.291	-
		Subtotal	11.518	1.951		1.296		1.296		-		1.296	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	279.659	30.122		19.553		29.620		-		29.620	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*	

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Funding increase of $10.015M from FY19 to FY20 reflect software development and operational testing, and allows for technology insertion for modernization.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

H2C2

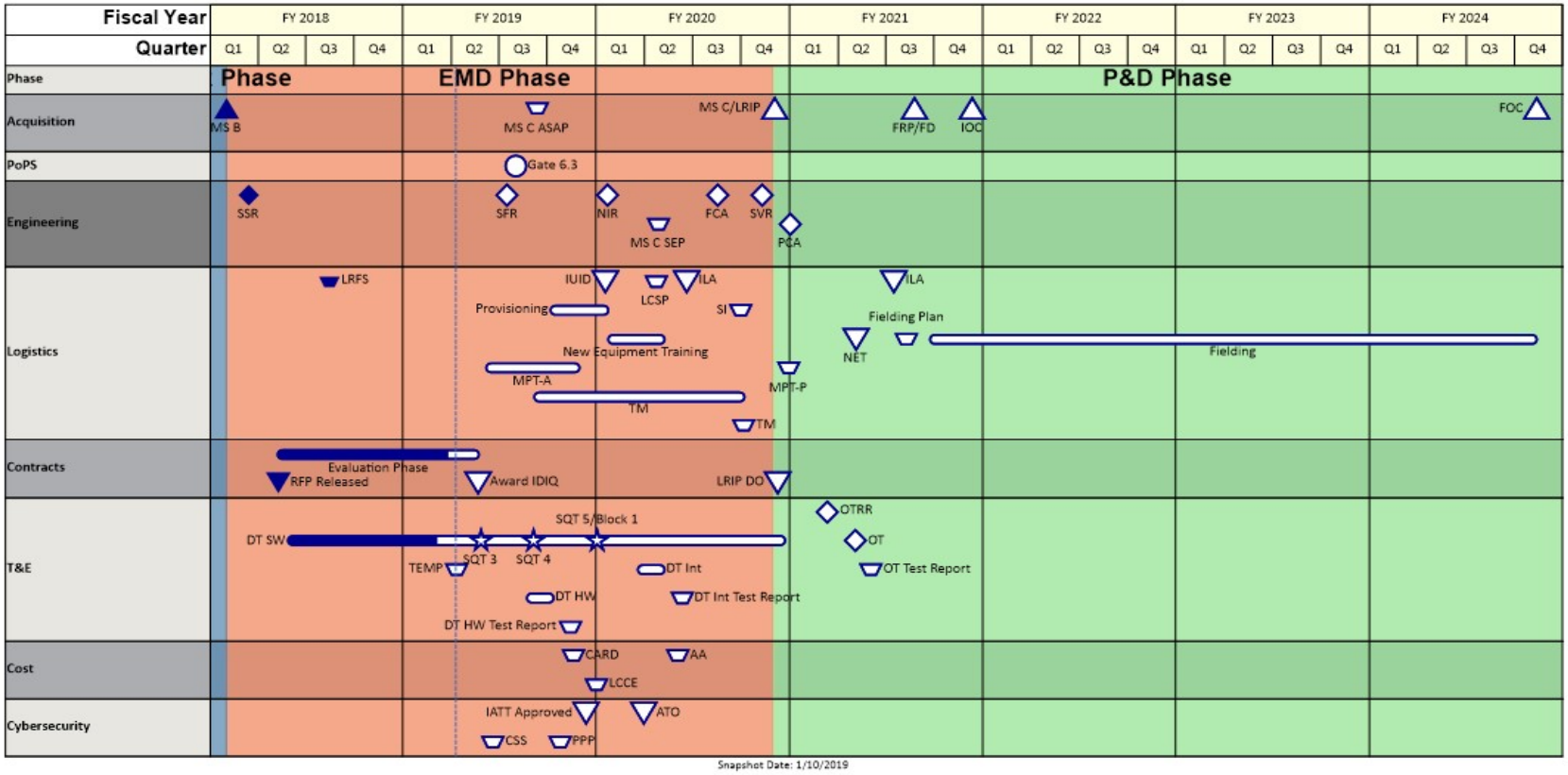

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

MARINE CORPS SYSTEMS COMMAND
Equipping our MARINES

JBC-P FoS Program Schedule

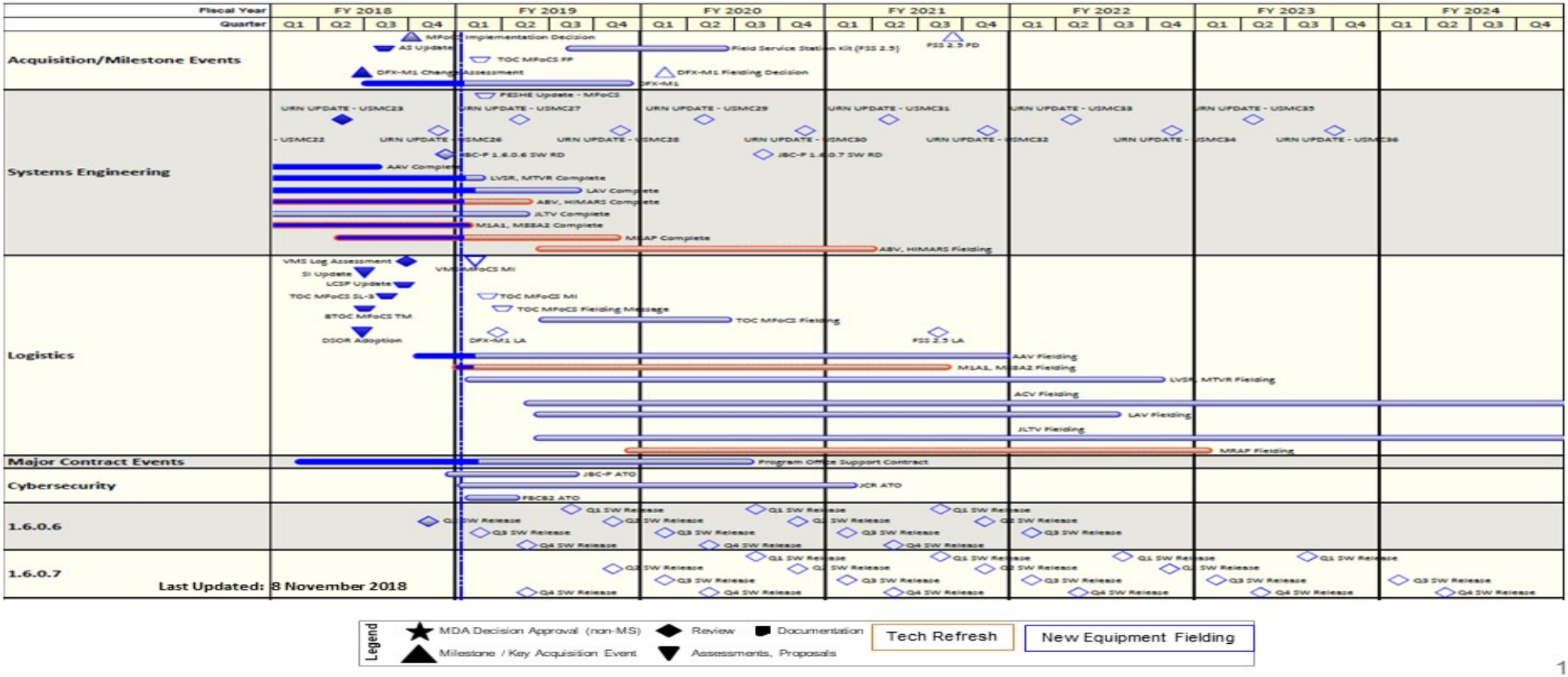

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

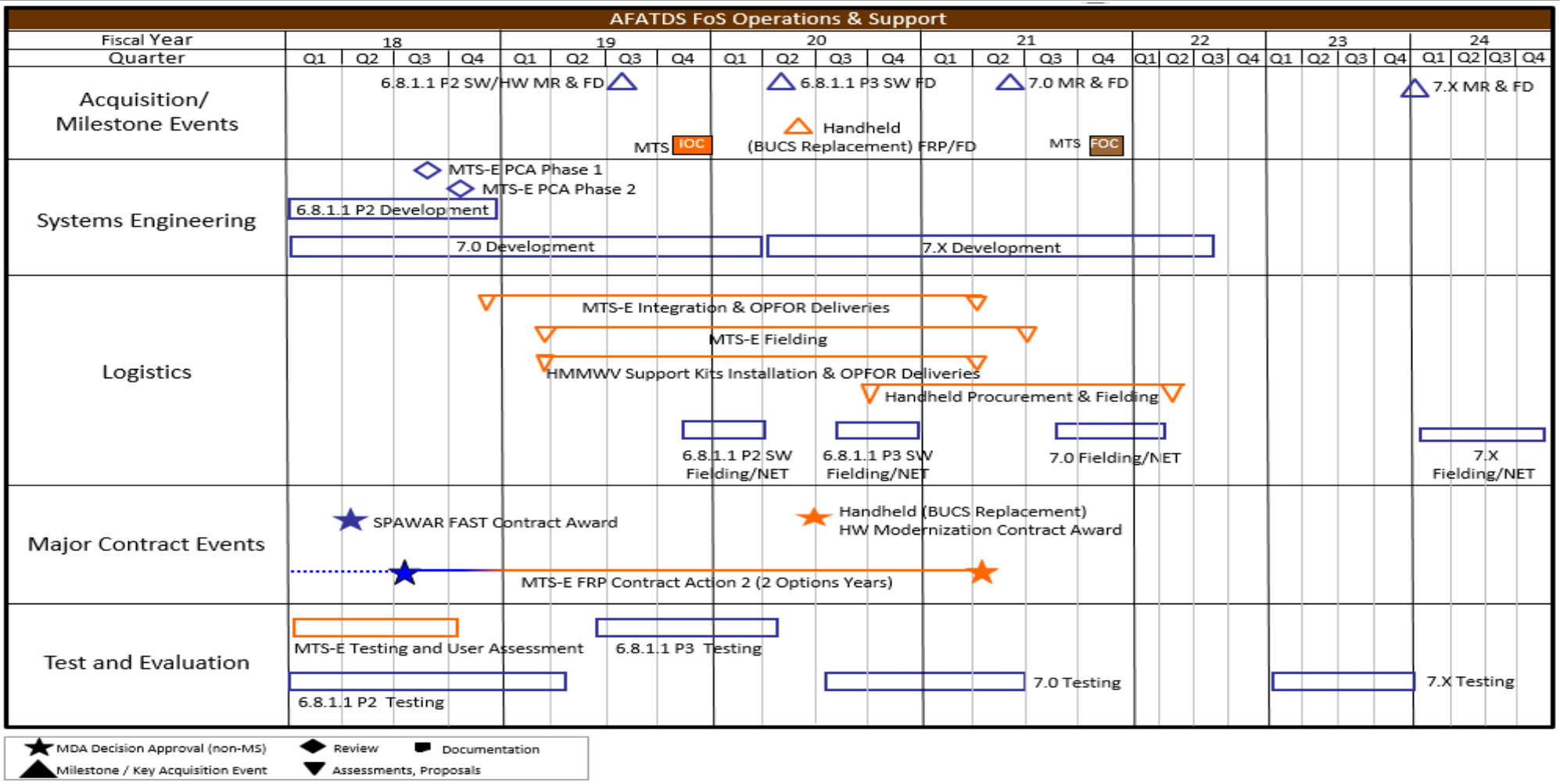


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

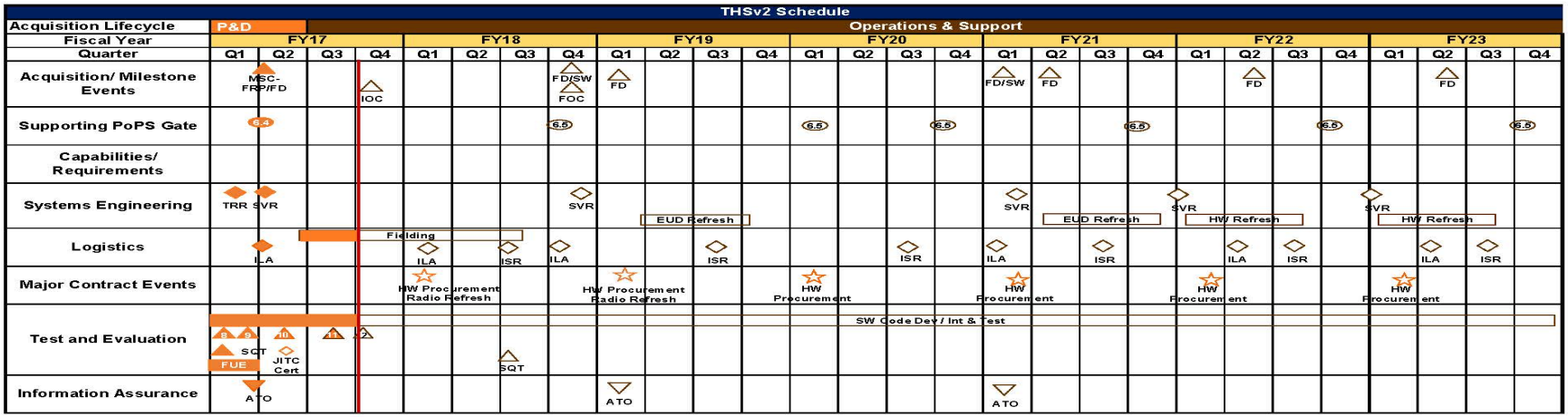
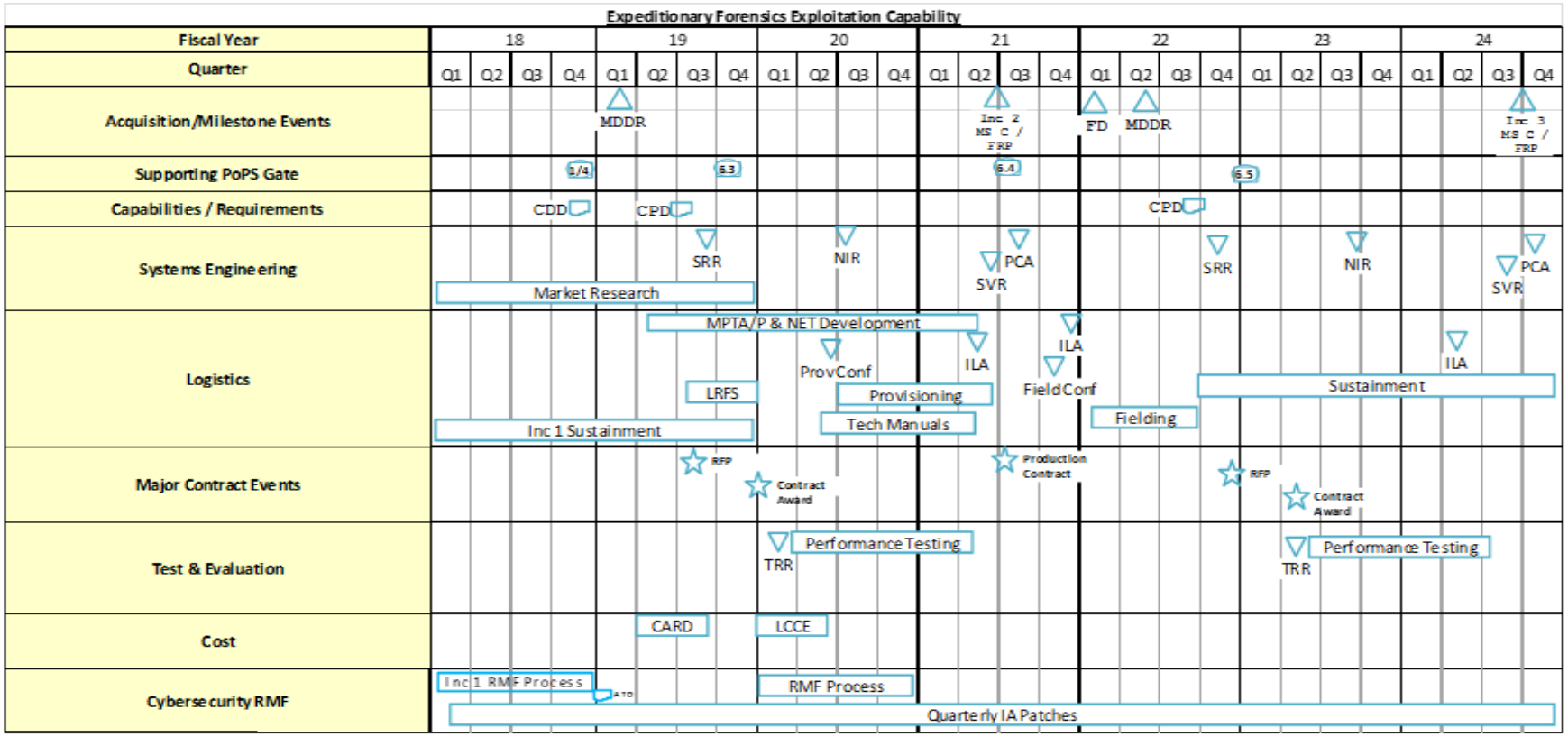


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

FOUO (U)

EFEC Program Schedule



FOUO (U) 1

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

FOUO (U)

IDS-MC Program Schedule

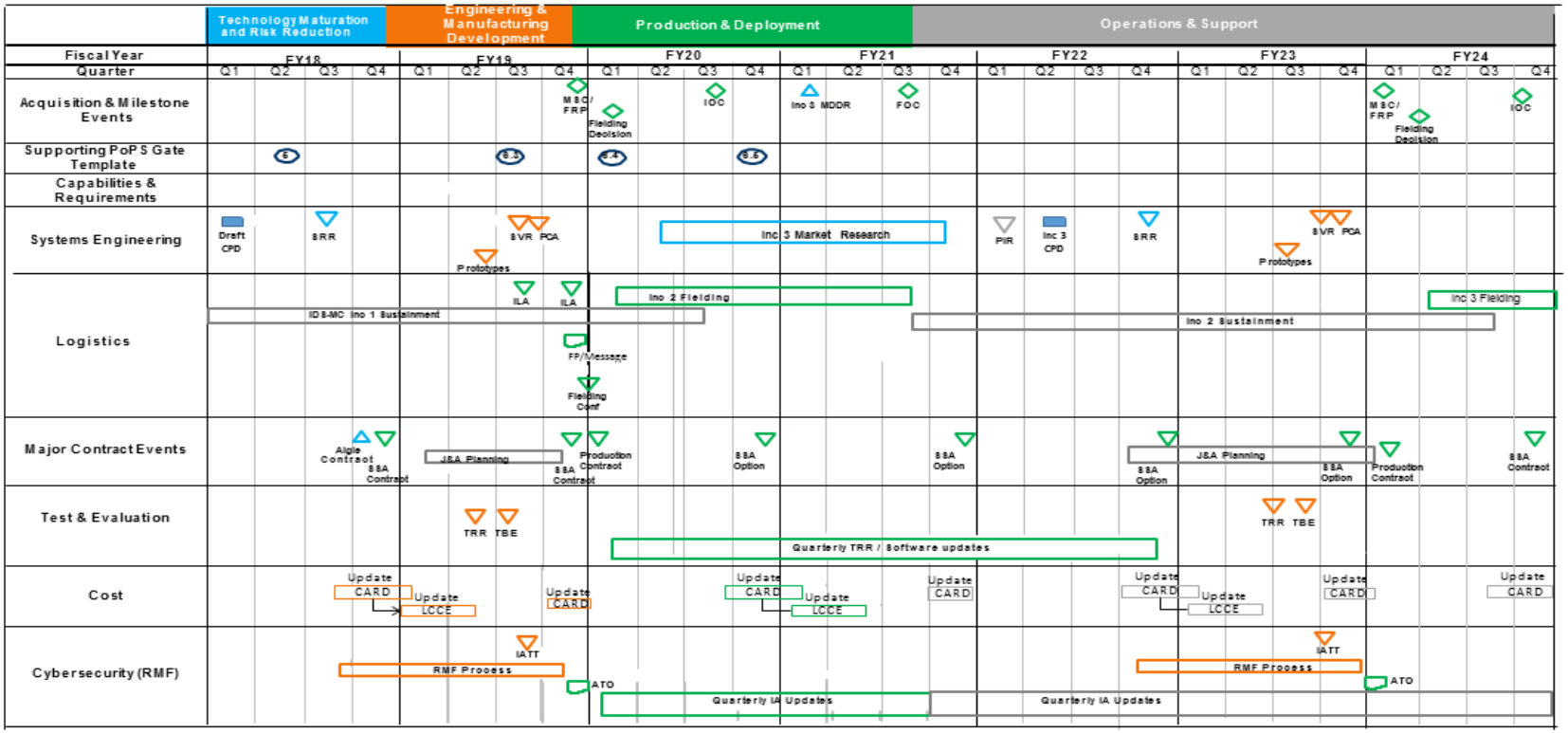


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

MAGTF C2 Program Schedule

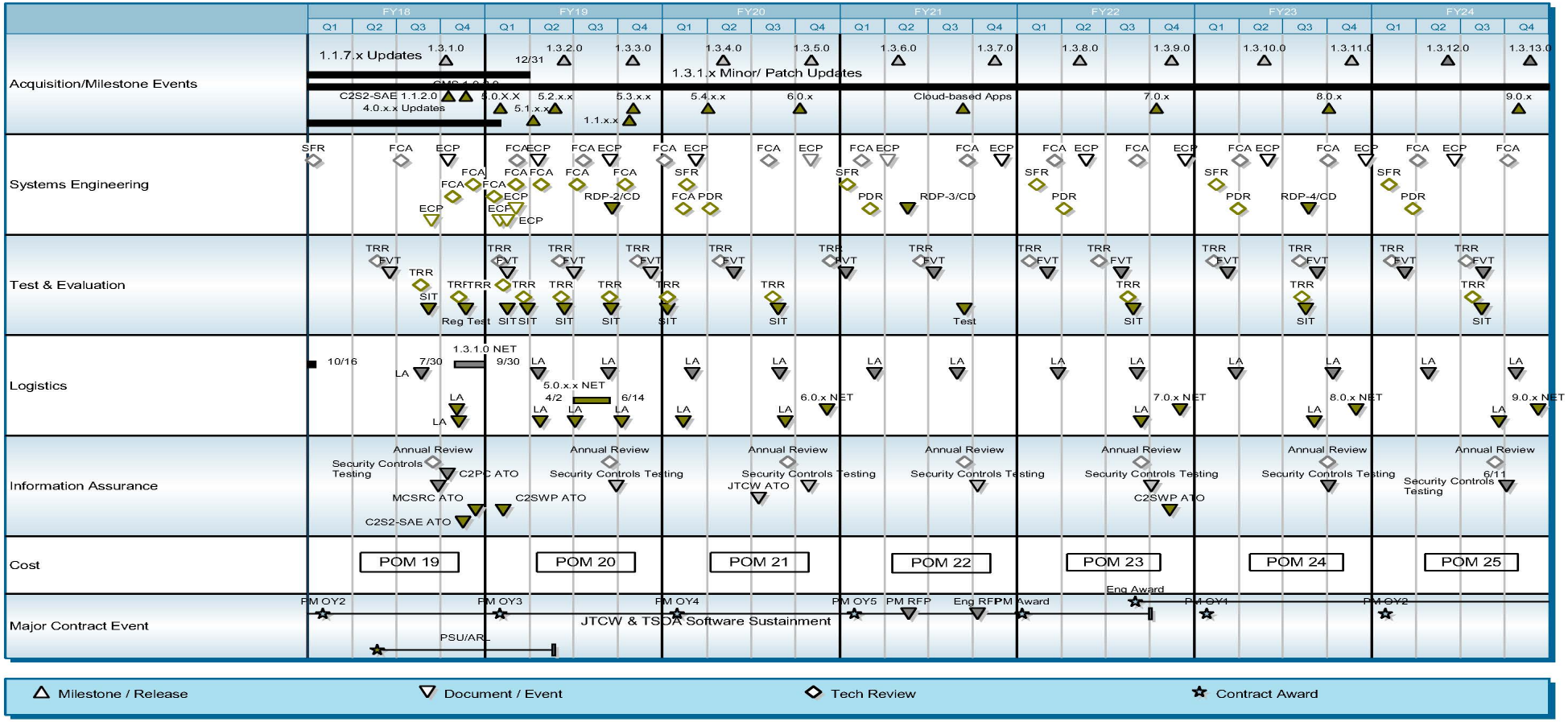


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

GCCS-TCO Schedule

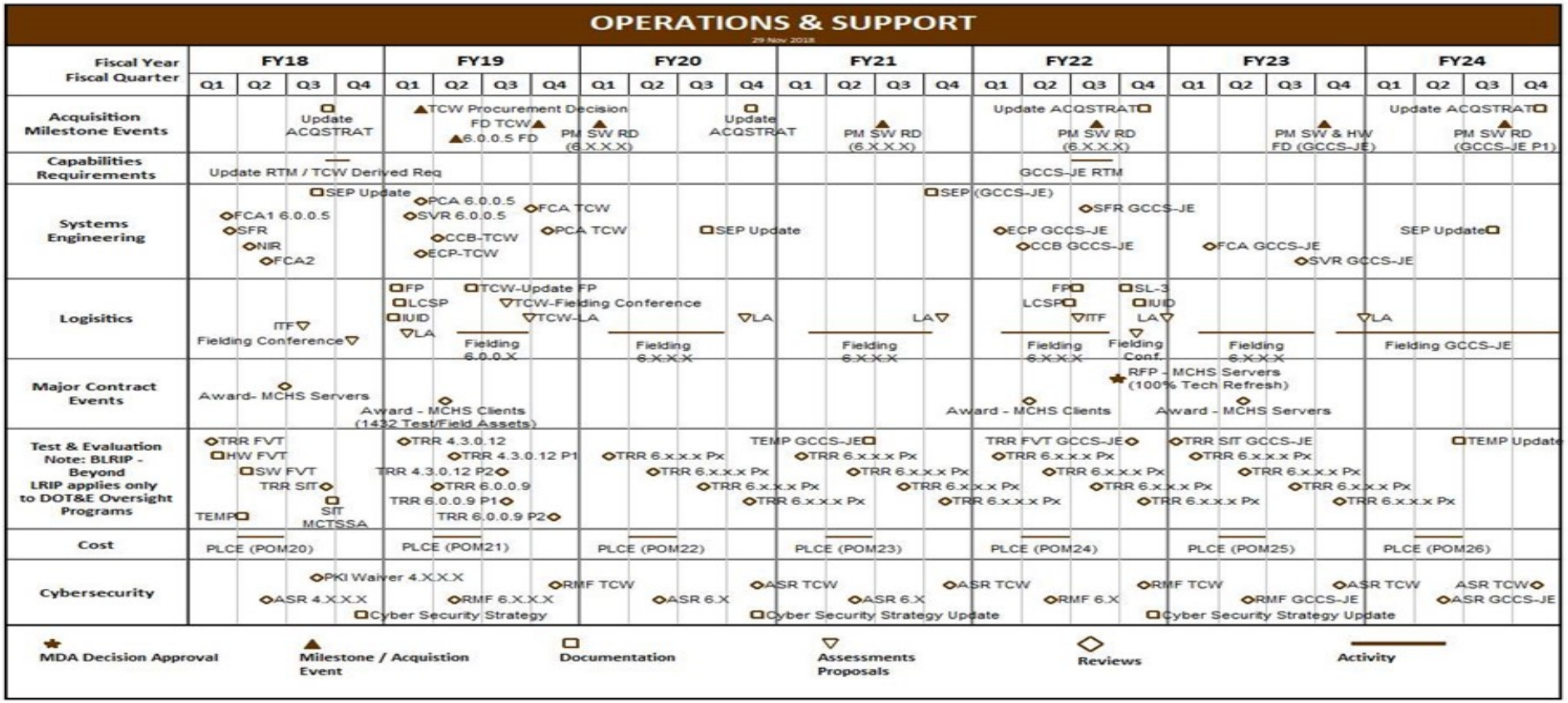


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2270 / *Exp Indirect Fire Gen Supt Wpn Sys*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2270				
MAGTF C2 Security Controls Testing FY19	3	2019	3	2019
MAGTF C2 TRR	3	2019	3	2019
MAGTF C2 ECP FY20	1	2020	1	2020
MAGTF C2 SIT	3	2020	3	2020
MAGTF C2 Security Controls Testing FY20	4	2020	4	2020
JBC-P FoS Platform Fielding - MTVR, LVSR, AAV	2	2019	3	2022
JBC-P FoS Platform Fielding - LAV	4	2019	3	2022
JBC-P FoS Platform Fielding - JLTV	2	2019	4	2024
H2C2 MS C	4	2020	4	2020
IDS-MC MS C/FRP	4	2019	4	2019
IDS-MC Fielding Decision	1	2020	1	2020
IDS-MC INC 3 MDDR	1	2021	1	2021
EFEC Inc 2 MDDR	1	2019	1	2019
EFEC TRR	1	2020	1	2020
EFEC MS C	2	2021	2	2021
GCCS TCO PM DW & HW FD 6.0.0.X	1	2019	1	2019
GCCS TCO Award MCHS Clients	2	2019	2	2019
GCCS TCO TRR SIT	3	2019	3	2019
GCCS TCO PM SW RD (6.X.X.X)	1	2020	1	2020
GCCS TCO SEP Update	3	2020	3	2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2273 / *Air Ops Cmd & Control (C2) Sys*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2273: *Air Ops Cmd & Control (C2) Sys*	437.381	11.130	8.467	5.397	-	5.397	6.685	7.660	5.913	6.000	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, Combat Operations Center (COC) has be realigned from Project C2273 to C2275, Radio Systems, to support US Marine Corps (USMC) Program Management Office (PMO) reorganization to improve support of USMC Operating Forces (OPFOR).

A. Mission Description and Budget Item Justification

Combat Operations Center (COC) - The COC provides commanders with a rapidly deployable, common, modular, and scalable operational agency that facilitates command and control across the full spectrum of MAGTF operations. The AN/TSQ-239A Family of Systems (FoS), is designed to provide centralized C2 Operational Facilities (OPFAC) to collect, process, and disseminate tactical data for the commander and staff of a Marine Expeditionary Force (MEF), Division, Wing, Marine Logistics Group, Regiment, Marine Air Group, Battalion, and Squadron. The COC provides the commander with a Common Operational Picture (COP) and tactical data and communications assets needed to plan and conduct operations in an expeditionary combat environment. The system enables analytical and intuitive decision-making with a modular and scalable equipment set consisting of a common module OPFAC, C2 system, visual displays, and SW. Existing Tactical Data System software, previously resident on numerous platforms throughout the Marine Air Ground Task Force (MAGTF), have been re-hosted on the COC system to provide commanders with integrated data access and communications COC transitions from Project C2273 to Project C2275 in FY19.

Composite Tracking Network (CTN) - Provides a ground based sensor netting solution that significantly improves situational awareness by correlating sensor measurement data (target position, speed, heading, Identification Friend and Foe (IFF), etc.) from local and remote radars in the Cooperative Engagement Capability (CEC) network. This data is then provided to the warfighter in the form of composite, real-time, air surveillance tracks to the Marine Air Command and Control node and is integral in providing an accurate representation of the airspace to reduce ground to air and air to air fratricide, facilitate more effective integration of air and surface fires, extend the air defensive capability of the Naval force in the littorals and enable integrated fire control (IFC) for the Marine Corps.

Remote Video Viewing Terminal (RVVT) - Consists of Commercial Off-The-Shelf (COTS) Video Down-Link (VDL) products such as the VideoScout Mobile Configuration 2 (VS-MC/2), VideoScout Mobile Configuration 3 (VS-MC/3), Man Portable Video Down-Link (MPVDL) that allow for the viewing and exploitation of Full Motion Video (FMV) from Intelligence, Surveillance and Reconnaissance (ISR) assets. VDL systems are mission critical for coordination of direct and indirect fires and the prevention of fratricide. These systems provide the warfighter with video and metadata from all USMC manned and unmanned aircraft to include but not limited to Raven B, Puma, Micro-UAS, Shadow, Predator, Fire Scout, and Litening Pod on P-3, AV8-B, and F/A-18. Data is displayed to Forward Observers (FO), Joint Fires Observers (JFO), Joint Terminal Attack Coordinators (JTAC), and Forward Air Controller (FAC).

Theater Battle Management Core System (TBMCS) - Joint mandated Air War planning tool for the generation, dissemination and execution of the Air Tasking Order (ATO). TBMCS is an Air Force led program, which provides the automated tools necessary to manage tactical air operations, execute area air defense and airspace

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management in the tactical area of operation, and coordinate operations with components of other military services. TBMCS is located at the Tactical Air Command Center (TACC), with remotes located throughout the area of operation. It is scalable, allowing for joint, coalition and service specific operations. It is an evolutionary acquisition program. USMC has initiated funding in support of Air Force led Command and Control Air Operation System - Command and Control Information Services (C2AOS-C2IS) requirements. USMC is funding participation in the Air Force's test events to ensure USMC requirements are being implemented as Command and Control Air Operation System - Command and Control Information Services (C2AOS-C2IS) will be the replacement for Air Force TBMCS. C2AOS-C2IS - is an ACAT III, post Milestone B, Air Force led program. C2AOS-C2IS will bring increased capability to the Operating Forces with a modern services based infrastructure and modern applications. C2AOS-C2IS provides additional tools to conduct: Situational Awareness and Assessment; Airspace De-confliction; Execution Management and Re-planning; Close Air Support; Targeting/Weaponeering; and Time Critical Targeting. Software development and sustainment keeps Marine Aviation relevant and operational in a joint theater. USMC risk reduction efforts include conducting Critical Analysis/Map Abstraction Layer implementation and assessment and Risk Reduction Testing.

The decrease in funding of $3.07M from FY19 to FY20 is primarily due to a decrease of $2.212M in TBMCS because of a reduction in software development support from Lockheed Martin.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: COC: Continued Capability Solution	1.223	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: -In FY19 COC funding is realigned to project 2275.					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: COC: Management Services	1.187	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: -In FY19 COC funding is realigned to project 2275.					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A					
Title: Composite Tracking Network (CTN): Support and Management Services	0.897	0.224	0.214	0.000	0.214
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue systems engineering efforts and updates to the software baseline to support annual CEC FQTs and IV&Vs, maintain cybersecurity updates and its Authority to Operate. - Continue travel, engineering support, and test support G/ATOR DT-1E, G/ATOR IOT&E, CEC DA T&E, CAB-E DT-2, and					
FY 2020 Base Plans: - Continue systems engineering efforts and updates to the software baseline to support annual CEC FQTs and IV&Vs, maintain cybersecurity updates and its Authority to Operate. - Continue travel, engineering support, and test support for G/ATOR Mode V Integration and CAB-E Field User Evaluation (FUE).					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease of 0.01 from FY 2019 to FY 2020 is due to ramp down of support for G/ATOR Mode V Integration.					
Title: Composite Tracking Network (CTN): Engineering Development	0.988	1.215	0.742	0.000	0.742
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue software certification to maintain interoperability with Cooperative Engagement Capability (CEC) Network to include associated engineering support. - Provide engineering support for CTN Software Development and Integration, CTN System Verification Testing, and Joint testing and certification efforts required to support the G/ATOR Mode V and CTN interface.					
FY 2020 Base Plans: - Continue software certification to maintain interoperability with Cooperative Engagement Capability (CEC) Network to include associated engineering support. - Continue engineering support for CTN Software Development and Integration and System Verification Testing, and certification efforts required to support the G/ATOR Mode V and CTN interface.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue to support CEC Independent Verification and Validation support and Formal Qualification Test (FQT) ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.473M from FY 2019 to FY 2020 is due to transition from development of the CAB-E antenna to production.					
Title: Composite Tracking Network (CTN): Developmental Testing and Cyber Security	1.883	0.733	0.719	0.000	0.719
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue integration and interoperability developmental testing with CAC2S, G/ATOR, and the TPS-59 Mode V. - Continue Information Assurance (IA) developmental activities. - Continue CTN Independent Verification and Validation (IV&V) testing to include associated engineering support. - Initiate G/ATOR Mode V Integration and Testing beginning 2Q FY 2019. ***FY 2020 Base Plans:*** - Initiate support for the CAB Family of Antennas (FoA) FQT and IV&V. - Conduct CAB-E Field User Evaluation (FUE) test events. - Continue support for G/ATOR Mode V Integration and Testing beginning 2Q FY 2019. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** decrease of $0.014M from FY 2019 to FY 2020 is due to reduction of CTN support for G/ATOR Mode V Integration and Testing.					
Title: RVVT: Preparation	1.112	1.125	0.876	0.000	0.876
Articles:	-	-	-	-	-
FY 2019 Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiate integration with type 1 encrypted sensor platforms to ensure interoperability with newly fielded airframes. - Complete Video Scout MC2 Integration with Windows 10 to comply with Cyber security requirements and maintain IA certifications. ***FY 2020 Base Plans:*** - Continue integration with type 1 encrypted sensor platforms to ensure interoperability with newly fielded airframes. - Initiate developmental and operational testing of software supporting newly fielded airframes. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.249M from FY 2019 to FY 2020 is due to completion of the VS MC2 WINDOWS 10 integration effort.					
Title: C2AOS-C2IS Product Development ***Articles:*** ***FY 2019 Plans:*** Decrease of $0.445M from FY 2018 to FY 2019 due to the completion of tactical map software development with C2AOS-C2IS in FY 2018. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	0.445 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: C2AOS-C2IS Support ***Articles:*** ***FY 2019 Plans:*** - Continue critical analysis efforts with C2AOS-C2IS applications in support of Air Force led multiservice operational test and evaluation and USMC led Operational Test (OTs) events. ***FY 2020 Base Plans:***	0.240 -	0.314 -	0.323 -	0.000 -	0.323 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue critical analysis efforts with C2AOS-C2IS applications in support of Air Force led multiservice operational test and evaluation, USMC led developmental test (DT), and Field User Evaluation (FUE). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.009 from FY 2019 to FY 2020 is due to increased travel to support USAF-led software builds.					
Title: C2AOS-C2IS Test and Evaluation	1.355	1.529	1.548	0.000	1.548
Articles:	-	-	-	-	-
FY 2019 Plans: - Participate in Air Force led Multiservice Operational Test and Evaluation (MOT&E) test event to ensure USMC requirements are addressed. - Continue information assurance testing on developmental software to determine the cyber security posture and conduct risk reduction testing to identify potential vulnerabilities. - Continue USMC support of Air Force C2AOS-C2IS Joint Partner testing. ***FY 2020 Base Plans:*** - Continue to support Air Force led MOT&E test event. - Continue information assurance testing on developmental software to determine the cyber security posture and conduct risk reduction testing to identify potential vulnerabilities. - Continue USMC support of Air Force C2AOS-C2IS Joint Partner testing. - Initiate USMC C2AOS/C2IS Developmental Testing (DT) and Field User Evaluation (FUE) ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.019 from FY 2019 to FY 2020 is due to USMC C2AOS/C2IS DT and FUE.					
Title: C2AOS-C2IS Management Services	0.335	0.396	0.256	0.000	0.256
Articles:	-	-	-	-	-
FY 2019 Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue management support efforts to participate in the development of C2AOS-C2IS. This includes Air Force led Multiservice Operational Test and Evaluation (MOT&E) test events to ensure USMC requirements are addressed, and support USMC led operational tests (OTs). ***FY 2020 Base Plans:*** - Continue management support efforts to participate in the development of C2AOS-C2IS which includes an Air Force led test event and development of software build events, in addition to USMC led Developmental Test (DT) and Field User Evaluation (FUE). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.14M from FY 2019 to FY 2020 is due to reduction of required program support for USAF led test events.					
Title: TBMCS-Engineering Support & Software Development Support	1.465	2.931	0.719	0.000	0.719
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue test and evaluation support for TBMCS upgrades for Joint Interoperability. -Continue development test and evaluation support of USMC developed MR6V and MR7V software releases which support the software baseline for Cyber Security upgrades as well as conduct annual Cyber Security Accreditation. ***FY 2020 Base Plans:*** - Continue test and Evaluation support for TBMCS upgrades for Joint Interoperability. - Continue development test and Evaluation support of USMC developed MR7V and MR8V software releases which support the software baseline for Cyber Security upgrades as well as conduct annual Cyber Security Accreditation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Decrease of $2.212M from FY 2019 to FY 2020 is due to a reduction of TBMCS SW development support from Lockheed Martin.					
Accomplishments/Planned Programs Subtotals	11.130	8.467	5.397	0.000	5.397

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4640CT: *CTN*	1.074	5.455	10.070	-	10.070	14.301	0.000	0.000	0.000	0.000	84.236
• PMC/4640CU: *MACCS*	2.662	0.050	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	96.599
• PMC/4640DX: *TBMCS*	1.902	1.477	1.464	-	1.464	1.293	1.315	1.353	1.400	Continuing	Continuing
• PMC/464023: *RVVT*	8.469	7.287	5.874	-	5.874	0.020	6.198	0.001	0.129	Continuing	Continuing
• PMC/463100: *COC*	16.185	5.768	8.440	-	8.440	12.123	12.365	16.005	16.318	Continuing	Continuing

Remarks

D. Acquisition Strategy

TBMCS - is an ACAT III, Air Force led program with joint interest/oversight. USMC will continue following the Air Force lead when fielding only the joint modules of TBMCS. As USMC unique requirements are identified, USMC will deviate accordingly to sufficiently sustain its systems. For instance TBMCS separately manages the development and fielding of software and hardware engineering change proposals for Information Assurance (IA) and functionality updates to ensure daily direct support of the Air Battle Plan in joint theaters of operation. The Air Force is in the process of transitioning TBMCS to C2AOS-C2IS. C2AOS-C2IS is an ACAT III, Air Force led joint interest program and identified as a viable replacement of TBMCS. C2AOS-C2IS is currently in development by the Air Force with an anticipated Full Deployment Decision (FDD) 4th quarter FY 2019. The USMC C2AOS-C2IS strategy is to support and participate in the Air Force led FY 2019 joint test events, implementation of a tactical map interface, and conduct risk reduction testing in order to ensure the USMC remains aligned with the Air Force mandated testing and fielding schedules.

CTN - The USMC's CTN acquisition strategy is to participate in the USN's Cooperative Engagement Capability (CEC) program procurement and testing, making necessary modifications to support the Marine Corps' requirement. The next major efforts are the development and procurement of the Common Array Block-Expeditionary (CAB-E) Antenna to replace the aging Composite Solid State Antenna (CSSA). CTN is to leverage the Naval Sea Systems Command (NAVSEA) led effort to procure CAB antennas. CTN is to procure fourteen (14) CAB-E variants FY 2019 - FY 2021. CTN will develop Mode V interfaces with the Ground/Air Task Oriented Radar (G/ATOR) and the Common Aviation Command and Control System (CAC2S). The mode V is CTN's Identification Friend or Foe (IFF) capability.

RVVT - The RVVT acquisition strategy is to continue integration of Video Down-Link (VDL) systems into new and existing sensor platforms by enhancing the encryption, range, and reducing the power and weight requirements in order to support existing and planned capabilities supporting targeting and fires activities. Efforts to integrate

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Full Motion Video (FMV) to support Joint Fires Observers (JFOs) and Joint Terminal Attack Controllers (JTACs) began in FY 2017 and is an ongoing requirement to maintain interoperability with new and existing sensor systems.

COC - The COC AN/TSQ-239 (V)1-4 is the foundation of USMC C2, meeting near term communications and network requirements across the OpFor. There is a continuing developmental effort to evolve the COC into a fully integrated MAGTF C2 capability. In FY18, the program continued to maintain industry standard and interoperability with disparate C2 systems across the joint forces.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	VARIOUS : VARIOUS	257.983	0.000		0.000		0.000		-		0.000	0.000	257.983	-
CTN Engineering Devlopment	C/CPFF	NAVSEA PEO IWS : Washington, DC	22.080	0.988	Feb 2018	1.215	Feb 2019	0.742	Feb 2020	-		0.742	Continuing	Continuing	Continuing
COC	WR	NSWC : Dahlgren,VA	5.991	0.030	Feb 2018	0.000		0.000		-		0.000	0.000	6.021	-
COC	WR	SSC-LANT : Charleston, SC	1.658	0.198	Feb 2018	0.000		0.000		-		0.000	0.000	1.856	-
COC	C/CPIF	SSC-Lant2 : Charleston, SC	0.283	0.995	Jul 2018	0.000		0.000		-		0.000	0.000	1.278	-
C2AOS-C2IS Tactical Map Software Development	SS/FFP	Raytheon Solypsis : Fulton, MD	0.000	0.445	Dec 2017	0.000		0.000		-		0.000	0.000	0.445	-
RVVT	MIPR	AMRDEC : Huntsville, AL	1.165	1.112	Mar 2018	1.125	Mar 2019	0.876	Nov 2019	-		0.876	0.000	4.278	-
		Subtotal	289.160	3.768		2.340		1.618		-		1.618	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	VARIOUS : VARIOUS	47.558	0.000		0.000		0.000		-		0.000	0.000	47.558	-
CTN Engineering Support	WR	NSWC : Dahlgren, VA	6.270	0.850	Jan 2018	0.208	Jan 2019	0.200	Jan 2020	-		0.200	Continuing	Continuing	Continuing
CTN Engineering Support	WR	NSWC : PHD, CA	0.609	0.033	Feb 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
CTN Engineering Support	Various	Travel-TAD : Not Specified	1.124	0.014	Sep 2018	0.016	Sep 2019	0.014	Sep 2020	-		0.014	Continuing	Continuing	Continuing
C2AOS-C2IS Engineering Support	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.240	Dec 2017	0.314	Dec 2018	0.323	Dec 2019	-		0.323	0.000	0.877	-
		Subtotal	55.561	1.137		0.538		0.537		-		0.537	Continuing	Continuing	N/A

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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	VARIOUS : VARIOUS	40.227	0.000		0.000		0.000		-		0.000	0.000	40.227	-
TBMCS Software Development	C/FFP	Lockheed Martin : Colorado Springs, CO	13.377	1.465	Mar 2018	2.931	Mar 2019	0.223	Mar 2020	-		0.223	Continuing	Continuing	Continuing
CTN Developmental Testing	WR	NSWC Corona : Corona, CA	2.185	0.425	Feb 2018	0.312	Feb 2019	0.250	Feb 2020	-		0.250	0.000	3.172	-
CTN Engineering/Cyber Security Development	C/CPFF	NAVSEA PEO IWS : Washington DC	1.667	1.458	Jan 2018	0.421	Jan 2019	0.469	Jan 2020	-		0.469	0.000	4.015	-
TBMCS/C2AOS-C2IS Engineering Support	MIPR	NSWC Crane : Crane, IN	0.000	0.000		0.000		0.496	Oct 2019	-		0.496	0.000	0.496	-
C2AOS-C2IS Operational Test Support	WR	MCOTEA : Quantico, VA	0.000	0.620	Dec 2017	0.788	Dec 2018	0.700	Dec 2019	-		0.700	0.000	2.108	-
C2AOS-C2IS Developmental Test Support	C/FFP	MCTSSA : Camp Pendleton, CA	0.000	0.315	Jan 2018	0.327	Jan 2019	0.425	Jan 2020	-		0.425	0.000	1.067	-
C2AOS-C2IS Cyber Security Training	MIPR	NSWC Dahlgren : Dahlgren, VA	0.000	0.420	Dec 2017	0.414	Dec 2018	0.423	Dec 2019	-		0.423	0.000	1.257	-
		Subtotal	57.456	4.703		5.193		2.986		-		2.986	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	VARIOUS : VARIOUS	28.671	0.000		0.000		0.000		-		0.000	0.000	28.671	-
COC Engineering Support	FFRDC	U.S. Army, MITRE : Stafford, VA	6.533	1.187	May 2018	0.000		0.000		-		0.000	0.000	7.720	-
C2AOS-C2IS Program Support	C/FFP	NSWC Dahlgren : Dahlgren, VA	0.000	0.335	Apr 2018	0.396	Apr 2019	0.256	Apr 2020	-		0.256	0.000	0.987	-
		Subtotal	35.204	1.522		0.396		0.256		-		0.256	0.000	37.378	N/A

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	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	437.381	11.130		8.467		5.397		-		5.397	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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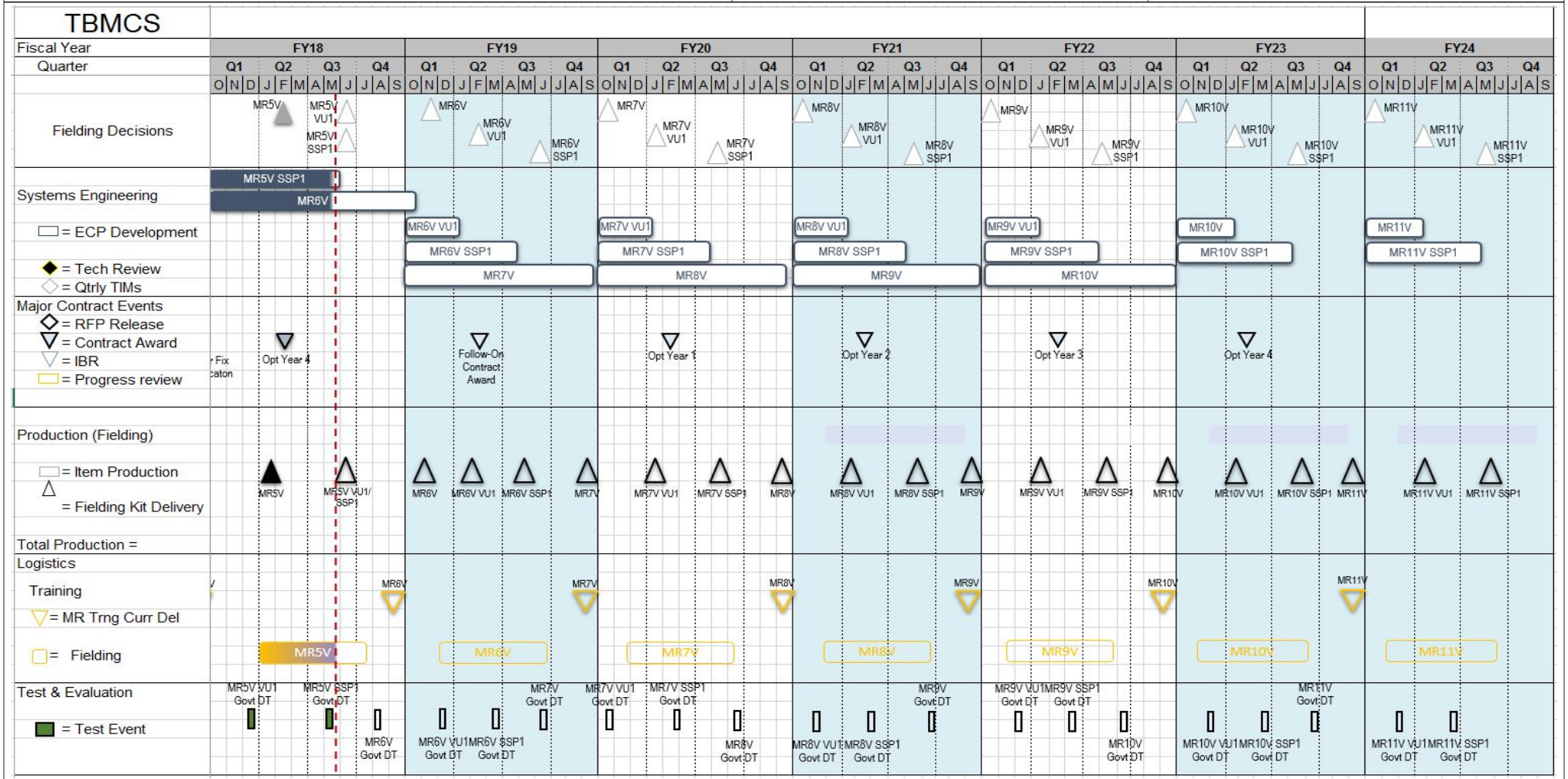

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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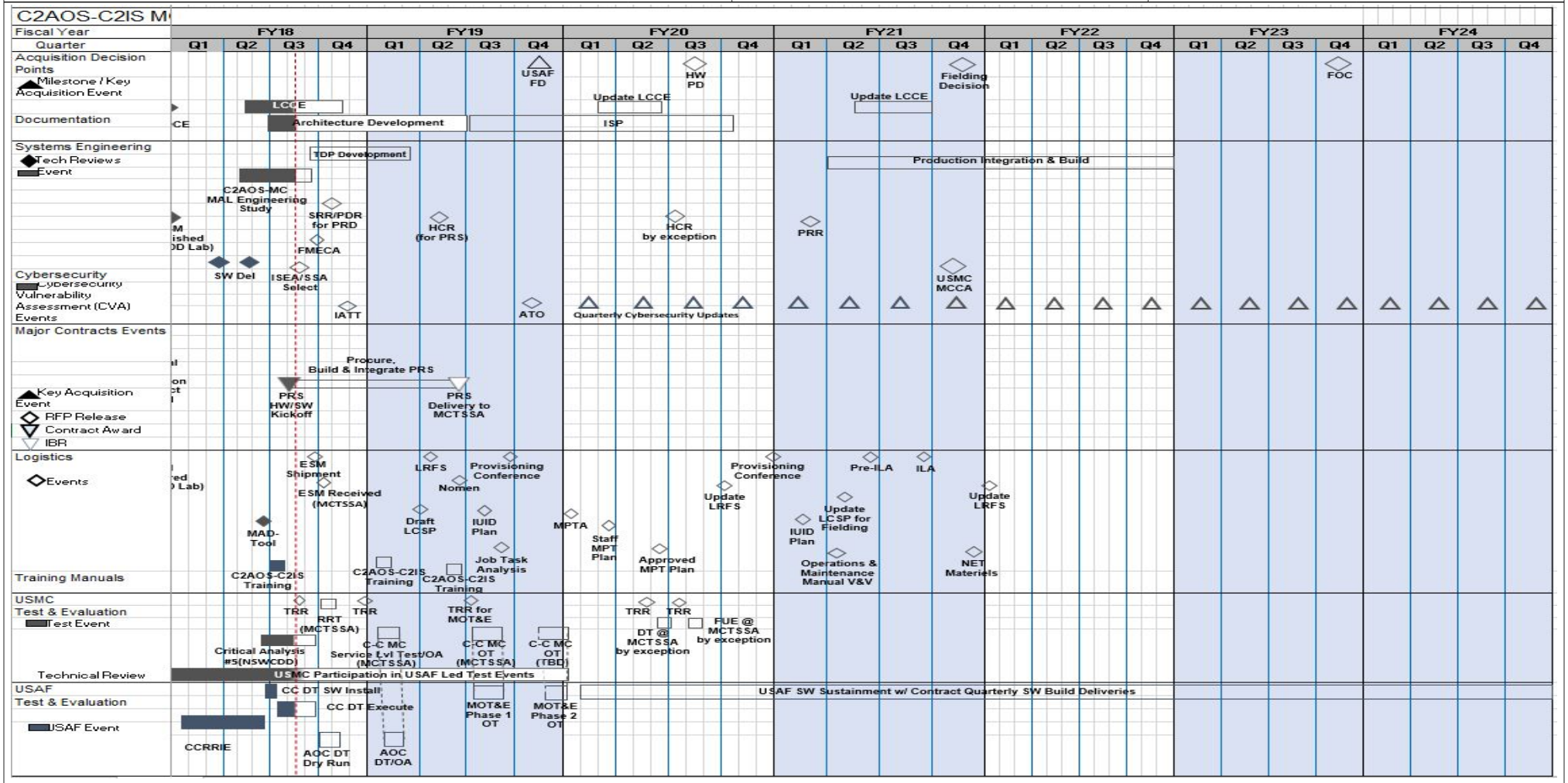

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RVVT

Remote Video Viewing Terminal Program Schedule

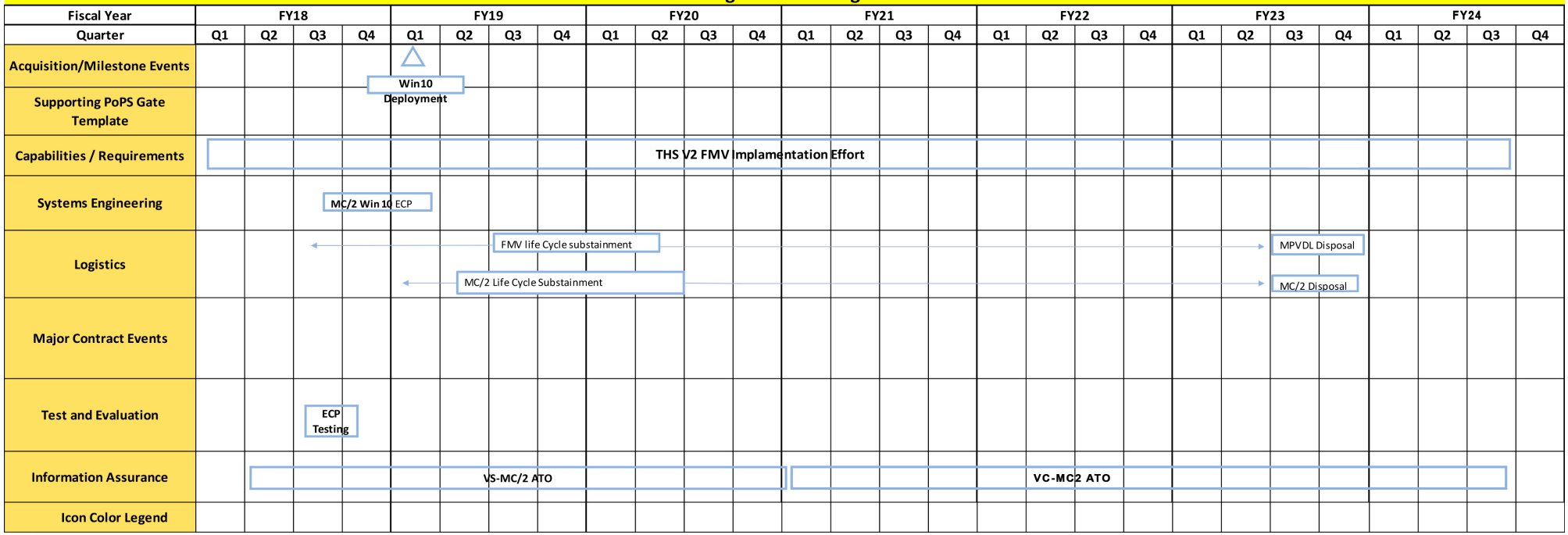

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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Combat Operations Center (COC) Program Schedule

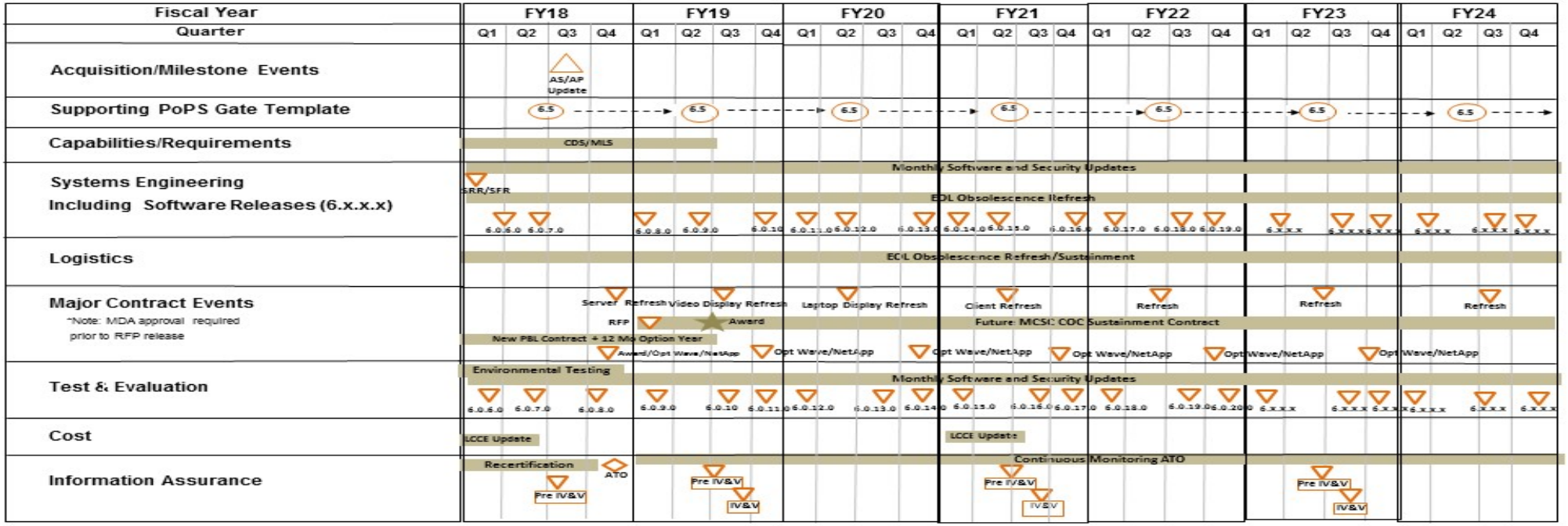

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2273 / *Air Ops Cmd & Control (C2) Sys*

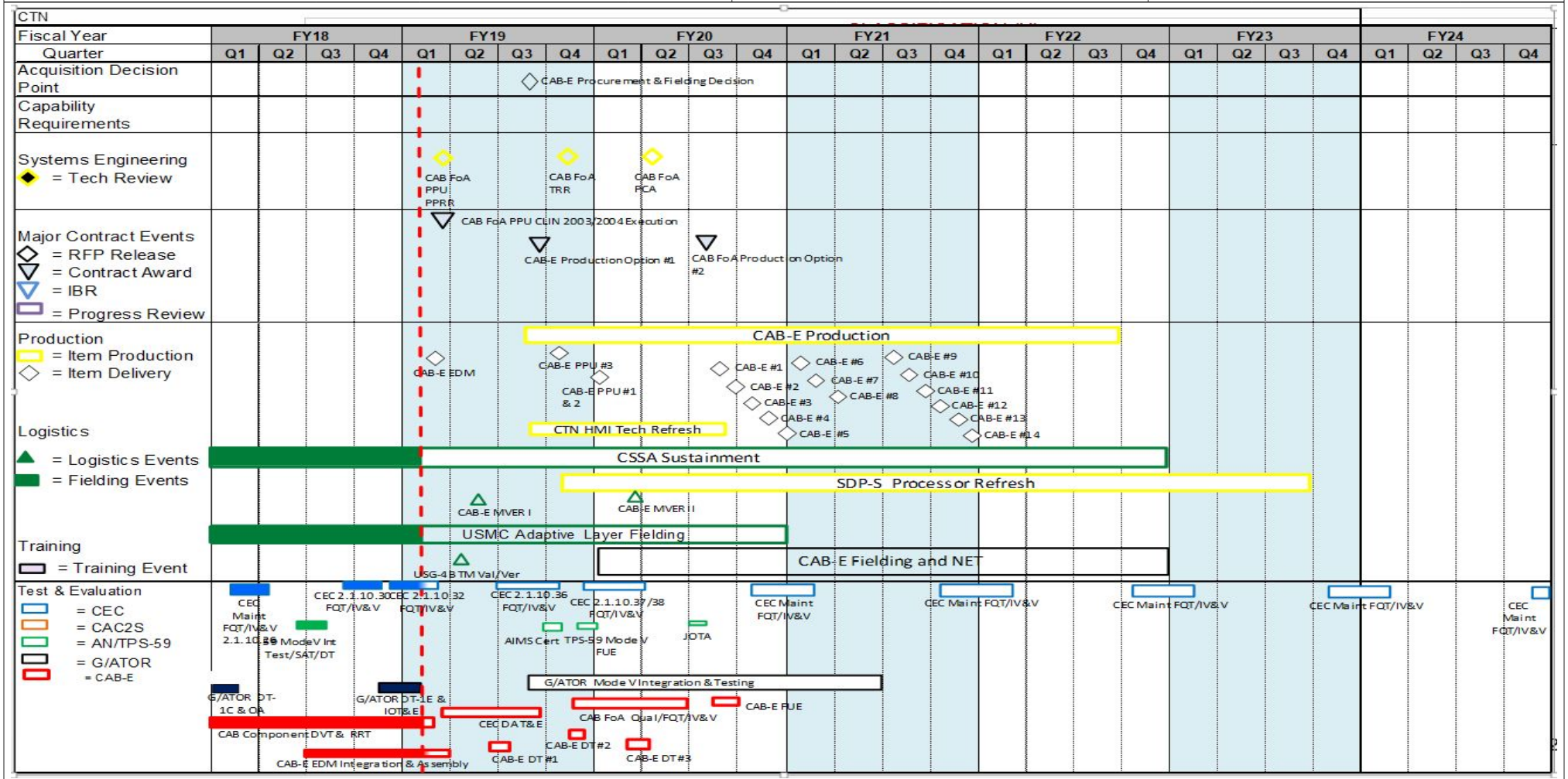

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2273 / *Air Ops Cmd & Control (C2) Sys*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2273				
TBMCS RDT&E IMS: TBMCS MR5V ECP Development	1	2018	3	2018
TBMCS RDT&E IMS: TBMCS MR6V ECP Development	1	2018	3	2019
TBMCS RDT&E IMS: TBMCS Option Year 4 Software Development Award	2	2018	2	2018
TBMCS RDT&E IMS: TBMCS MR5V Government Developmental Test	1	2018	3	2018
TBMCS RDT&E IMS: TBMCS MR7V ECP Development	1	2019	3	2020
TBMCS RDT&E IMS: TBMCS Software Development Contract Award	2	2019	2	2019
TBMCS RDT&E IMS: TBMCS MR6V Government Developmental Test	4	2018	2	2019
TBMCS RDT&E IMS: TBMCS MR8V ECP Development	1	2020	3	2021
TBMCS RDT&E IMS: TBMCS Option Year 1 Software Development Award	2	2020	2	2020
TBMCS RDT&E IMS: TBMCS MR7V Government Developmental Test	3	2019	2	2020
TBMCS RDT&E IMS: TBMCS MR8V Government Developmental Test	3	2020	2	2021
CTN RDT&E IMS: CTN - CAB FoA Technical Readiness Review	4	2019	4	2019
CTN RDT&E IMS: CTN - CAB-E Developmental Test #1	2	2019	3	2019
CTN RDT&E IMS: CTN - CAB-E Developmental Test #2	4	2019	4	2019
CTN RDT&E IMS: CTN - Cooperative Engagement Capability Design Agent Test & Evaluation	1	2019	3	2019
CTN RDT&E IMS: CTN - TPS-59 Mode V Joint Operational Test Approach (JOTA)	3	2020	3	2020
CTN RDT&E IMS: CTN - TPS-59 Mode V Field User Evaluation (FUE)	4	2019	1	2020
CTN RDT&E IMS: CTN - G/ATOR DT-1E and IOT&E	4	2018	1	2019
CTN RDT&E IMS: CTN - CAB-E FoA Qualification/FQT/IV&V	4	2019	2	2020
CTN RDT&E IMS: CTN - G/ATOR Mode V Integration and Testing	3	2019	2	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2273 / *Air Ops Cmd & Control (C2) Sys*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CTN RDT&E IMS: CTN - CAB-E Developmental Test #3	1	2020	2	2020
RVVT RDT&E IMS: RVVT Full Operational Capability (FOC)	4	2018	4	2018
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS TDP Development	3	2018	1	2019
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USMC MAL Engineering Study	2	2018	3	2018
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS Software Development	1	2018	2	2018
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS Regression Testing of Tactical Map Interface	2	2018	2	2018
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS Technical Readiness Review	3	2018	3	2018
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS Technical Readiness Review 2	4	2018	4	2018
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USMC Participation of USAF Development Tests	2	2018	1	2019
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS MOT&E Technical Readiness Review	3	2019	3	2019
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USMC Service Level Test / Operational Assessment	1	2019	1	2019
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USMC Operational Tests	3	2019	1	2020
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USAF MOT&E Phase 1	2	2019	2	2019
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS Cyber Security Vulnerability Assessment	2	2019	3	2019
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USAF MOT&E Phase 2	4	2019	1	2020
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS Compliance Testing	4	2019	4	2019
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS - USAF Full Deployment Decision (FDD)	4	2019	4	2019
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS Technical Readiness Review 3	2	2020	2	2020
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USMC Developmental Testing	2	2020	2	2020
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS Technical Readiness Review 4	3	2020	3	2020
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USMC Field User Evaluation	3	2020	3	2020
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USMC Cybersecurity Updates	1	2020	4	2024
C2AOS-C2IS RDT&E IMS: C2AOS-C2IS USAF Software Builds	1	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2274 / *Command & Control Warfare Sys*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2274: *Command & Control Warfare Sys*	45.162	8.087	11.992	10.454	-	10.454	11.698	12.360	27.399	22.547	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

COUNTER RADIO-CONTROLLED IMPROVISED EXPLOSIVE DEVICE (RCIED) ELECTRONIC WARFARE (USMC CREW) SYSTEMS are vehicle mounted and dismounted modular programmable multi-band radio frequency jammers designed to deny enemy use of selected portions of the radio frequency spectrum in the vicinity of the jammer to counter the RCIED threat. The mounted and dismounted systems provide Marines in vehicle convoys and on foot with the necessary protection from the continued and evolving threat of deadly RCIEDs. Legacy CREW systems are currently deployed to meet threats in the multiple theaters of operation and fielded to selected Marine Expeditionary Units (MEU)/Marine Expeditionary Forces (MEF) in support of worldwide deployment. To continue to support the various worldwide missions, each CREW unit receives customized programming (loadsets) to counter that area's RCIED threats. The testing, programming development, and product improvement research are funded with the CREW's RDTE,N funding and prioritized to meet the growing demand for all deployed Marine units. CREW received an Urgent Statement of Need (USON) 30 January 2018 directing the development of Multi-Function Electronic Warfare (MFEW) systems. MFEW will combine the capabilities to conduct the existing Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (CREW) mission, with electronic warfare (EW), electronic attack (EA) to Counter-Unmanned Aircraft System (CUAS), Networking, Direction Finding, and future forward looking capabilities as they are developed. Legacy Crew Capabilities and the MFEW development will be components of the Marine Electronic Warfare Ground Family of Systems (MEGFoS).

MEGFoS will provide interconnected electronic warfare systems for use at fixed sites, on tactical vehicles, and dismounted that will operate across a range of frequencies in order to provide the Marine Corps that ability to maneuver efficiently inside the electromagnetic spectrum. MEGFOS provides the ability to protect friendly use of spectrum, sense all spectrum usage in an area of responsibility, and to target adversaries inside spectrum with the intent to deny, delay or degrade an adversary's decision making cycle.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: *USMC CREW - Product Development	3.896	8.550	3.151	0.000	3.151
Articles:	-	-	-	-	-
FY 2019 Plans: -Develop software waveform loadsets for USMC CREW Systems including mounted and dismounted system's waveforms used specifically to counter Improvised Explosive Device (IED) and CUAS threat worldwide. Increase loadset development of advanced threats and communications targets. -Develop additional software improvements to overcome select CREW systems capability issues not limited by technology obsolescence.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2274 / *Command & Control Warfare Sys*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Develop MVPA II vehicle installation kits (VIK) for CREW mounted systems in order to support the integration and installation of the upgrade kits into Marine Corps vehicle platform. -Conduct system level verification testing on the Modi II and MFEW system to counter RCIED threats. -Develop increased capability to the baseline MFEW system in order to network MFEW systems together. -The change of FY19 (2019PB)to FY19 (2020PB)is for increased investment in development of MFEW capability. This will be added to baseline system that will be fielded in FY20. ***FY 2020 Base Plans:*** -Develop increased capability packages for the Modi II and MFEW systems. Specifically, Direction finding capability, an Advanced GUI and Integration in the MAGTF Common Handheld solution. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease of $5.399M from FY19 to FY20 is due to the completion of MVPA II VIK development and some of its testing.					
Title: *USMC CREW - Support	0.155	0.159	0.164	0.000	0.164
Articles:	-	-	-	-	-
FY 2019 Plans: -Conduct systems engineering support at a reduced level for the CREW family of systems and integration support required for the mounted CREW into Marine Expeditionary Units (MEU)/Marine Expeditionary Force (MEF) mission profiles by developing vehicle installation kits for these mounted units. -Provide system support for the Modi II, and Universal Test Sets by analyzing CREW performance impacts resulting from compatibility and environmental risk impacts. ***FY 2020 Base Plans:*** -Provide systems engineering support for MFEW (Modi II, MVPA II) and Universal Test Sets by analyzing performance impacts resulting from compatibility, technology and software updates and environmental risks. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2274 / *Command & Control Warfare Sys*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
No significant change from FY 2019 to FY 2020					
Title: *USMC CREW - Test and Evaluation	2.192	1.301	1.019	0.000	1.019
Articles:	-	-	-	-	-
FY 2019 Plans: -Conduct test events in support of the Modi II and MFEW systems regarding its ability to defeat the RCIED and CUAS Threats and provide ES and EA against Communications Targets. -Test the mounted and dismounted MFEW production units that will be fielded for Marine Expeditionary Units (MEU)/Marine Expeditionary Force (MEF) use. -Conduct compatibility testing against USMC and other services devices to ensure Marine Corps MFEW systems maintain required performance capabilities. -Conduct mounted and dismounted MFEW improvements testing to distinguish possible design limitations that can be improved to optimize the Marines use of the system. -Initiate test events for loadsets against advanced and emerging target sets. -The change of FY19 (2019PB)to FY19 (2020PB)is due to late delivery of MFEW systems resulting in final test events being conducted in 1QFY20. Additionally planned events were updated to better defined test events being conducted.					
FY 2020 Base Plans: -Test of the mounted and dismounted MFEW Engineering Changes that will be fielded. -Continue compatibility testing against USMC and other services devices to ensure Marine Corps MFEW systems maintain required performance capabilities. -Test new and developing load-sets ability to exploit or defeat advanced and emerging threat systems.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The decrease of $0.282M from FY19 to FY20 is due to reduced hardware development testing. Baseline MVPA II systems will be fielded by 2Q FY20.					
Title: *USMC CREW - Management Services	1.844	1.982	2.041	0.000	2.041
Articles:	-	-	-	-	-
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Manage the Techniques development group for RCIED, CUAS, and communictions techniques for the Modi II, MFEW and Universal Test Set (UTS) - Manage System Engineering and Test and Evaluation (T&E) teams associated with MFEW, Modi II and associated development and upgraded capabilities. - Conduct system level configuration management activities for all legacy CREW, MFEW equipment and associated software ***FY 2020 Base Plans:*** -Initiate development of MEGFoS capabilities. Develop a common, open hardware backplane based off the CMOSS program, and an open software architecture. This includes development of hardware that is interoperable across the Mounted, Dismounted and fixed site systems, integration of advanced Transceivers to conduct advanced electronic attack (EA)/electronic support (ES) capabilities, incorporation of algorithms to conduct precision geolocation autonomously using AI, fully networked electronic warfare to provide a high level of situational awareness to commanders and Marines at the company level, increase frequency range to provide radar EA , and incorporation advance electronic warfare (EW) techniques. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Title: MEGFoS-Product Development	0.000	0.000	4.079	0.000	4.079
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** -Initiate development of MEGFoS capabilities such as electronic attack (EA)/electronic support (ES) capabilities, precision geolocation, fully networked, radar EA, advance electronic warfare (EW) techniques, and enhanced frequency range. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The increase of $4.079M from FY19 to FY20 is due to the initiation of the MEGFOS development. MEGFos will develop capabilities such as EA/ES, precision geolocation, fully networked, radar EA, advance EW techniques, and enhanced frequency range.					
Accomplishments/Planned Programs Subtotals	8.087	11.992	10.454	0.000	10.454

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 6520: *MAGTF EW Ground FoS*	0.000	0.000	0.000	-	0.000	0.000	0.000	35.000	80.500	Continuing	Continuing

Remarks

D. Acquisition Strategy

COUNTER RADIO-CONTROLLED IMPROVISED EXPLOSIVE DEVICE (RCIED) ELECTRONIC WARFARE (USMC CREW): CREW mounted and dismounted systems provide Marines in vehicle convoys and on foot with the necessary protection from the continued and evolving threat of deadly RCIEDs in all current and future operations. The program will continue to develop new counter techniques, improve capabilities, enhance software and develop upgrades to counter evolving threats and prevent technology obsolescence. Activities include waveform development, non-recurring engineering for system enhancements, capability upgrades, and the testing/ government studies required to support these changes. The CVRJ Program consists of 3100 CREW Vehicle Receiver Jammer CVRJ(V)2. The Modi II program consists of 565 dismounted systems currently being issued to deploying Units for CREW and Counter UAS capability. Modi II and the MVPA II are considered Multi- functional Electronic Warfare (MFEW) systems. FY 19 plan reflects test and evaluation for MFEW development efforts to include software load-set development and capability testing of the Modi II and MVPA II Systems. FY20 plan reflects further test and evaluation for MFEW development efforts to include software load-set development and increased capability testing of the MFEW System, which would provide both CREW and Counter Unmanned Aerial Systems (C-UAS), electronic support, geolocation, direction finding, and networking. MFEW systems are considered a bridge capability based on a USON requirement and will be replaced by the MAGTF Electronic Warfare Ground Family of Systems (MEGFoS) systems in FY25.MEGFoS will provide a significant improvement is capability when compared to MFEW and what is commercially available today.

MEGFoS: will employ an evolutionary acquisition strategy utilizing an incremental and phased approach
for development and fielding. The first increment will focus on developing a common hardware and software standard and the integration of legacy capabilities (MFEW) into that standard. Additionally, it will develop and integrate all EW sensors into a common operating picture allowing all elements of the MAGTF to gain and maintain awareness in the Electro-Magnetic (EM) Spectrum. It will also integrate existing legacy capabilities to include, communications EW, CREW and C-UAS. The subsequent phases will be structured to develop and integrate additional capability into the suite of standards and software. This will include but is not limited to, Cyber, Communications, Signature Management, and advanced signals detection and attack techniques. Increment 1 will procure LRIP quantities of 50 in FY23, for Operational Test at the beginning of FY 24, in support of a full rate production decision in FY24. IOC is projected in 4Q FY25.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2274 / *Command & Control Warfare Sys*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
USMC CREW	WR	NSWC CD : CRANE, IN	6.124	1.506	Jun 2018	2.168	Feb 2019	3.151	Nov 2019	-		3.151	Continuing	Continuing	Continuing
USMC CREW	WR	SSC.A : CHARLESTON, SC	0.000	2.174	Jun 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
USMC CREW	TBD	MCSC : QUANTICO, VA	0.000	0.216	Jun 2019	6.382	Jun 2019	0.000		-		0.000	Continuing	Continuing	Continuing
MEGFoS	TBD	MCSC : QUANTICO, VA	0.000	0.000		0.000		4.079	Dec 2019	-		4.079	Continuing	Continuing	Continuing
Prior Year Cumulative Funding	Various	VARIOUS : VARIOUS	7.549	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	13.673	3.896		8.550		7.230		-		7.230	Continuing	Continuing	N/A

Remarks

USMC CREW NSWC CRANE (Crane, IN) FY18 - FY20: Design, develop and contract engineering changes to the CREW systems and to develop software Threat Load (TL) loadsets for all CREW systems to continue to counter the evolving RCIED Threats.

MEGFoS capabilities developed into MFEW 2.0 in accordance with FY-18 USON.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
USMC CREW	WR	SSC-A : CHARLESTON, SC	1.256	0.155	Jun 2018	0.159	Feb 2019	0.164	Feb 2020	-		0.164	Continuing	Continuing	Continuing
Prior Years Cumulative Funding	Various	VARIOUS : VARIOUS	5.161	0.000		0.000		0.000		-		0.000	0.000	5.161	-
		Subtotal	6.417	0.155		0.159		0.164		-		0.164	Continuing	Continuing	N/A

Remarks

USMC CREW SSC-Atlantic FY18 - FY20: System Engineering and validation and verification.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
USMC CREW	MIPR	YPG : YUMA, AZ	8.802	1.892	May 2018	1.301	Apr 2019	0.370	Apr 2020	-		0.370	Continuing	Continuing	Continuing
USMC CREW	MIPR	SOCOM : TAMPA, FL	0.000	0.000		0.000		0.649	Jun 2020	-		0.649	Continuing	Continuing	Continuing
USMC CREW	WR	NSWC CD : CRANE, IN	2.335	0.300	Jan 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prior Years Cumulative Funding	Various	VARIOUS : VARIOUS	4.347	0.000		0.000		0.000		-		0.000	0.000	4.347	-
		Subtotal	15.484	2.192		1.301		1.019		-		1.019	Continuing	Continuing	N/A

Remarks

USMC CREW YPG (Yuma Proving Grounds, AZ) FY18 - FY20: Provide test ranges and results analysis for all CREW systems.
USMC CREW NSWC CD FY18 - FY20: Provide test assets and testing.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
USMC CREW	WR	NSWC CD : CRANE, IN	7.986	1.534	Jul 2018	1.578	Mar 2019	1.627	Jan 2020	-		1.627	Continuing	Continuing	Continuing
USMC CREW	C/CPFF	NSWC DD : DAHLGREN VA	0.000	0.310	Jan 2018	0.404	Feb 2019	0.414	Jan 2020	-		0.414	Continuing	Continuing	Continuing
Prior Years Cumulative Funds	Various	VARIOUS : VARIOUS	1.602	0.000		0.000		0.000		-		0.000	0.000	1.602	-
		Subtotal	9.588	1.844		1.982		2.041		-		2.041	Continuing	Continuing	N/A

Remarks

USMC CREW NSWC CRANE FY18 - FY20: Engineering and Acquisition support.
USMC CREW NSWC DD FY18 - FY20: Configuration Management (CM), Liaison Officer (LNO) and engineering support.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	45.162	8.087		11.992		10.454		-		10.454	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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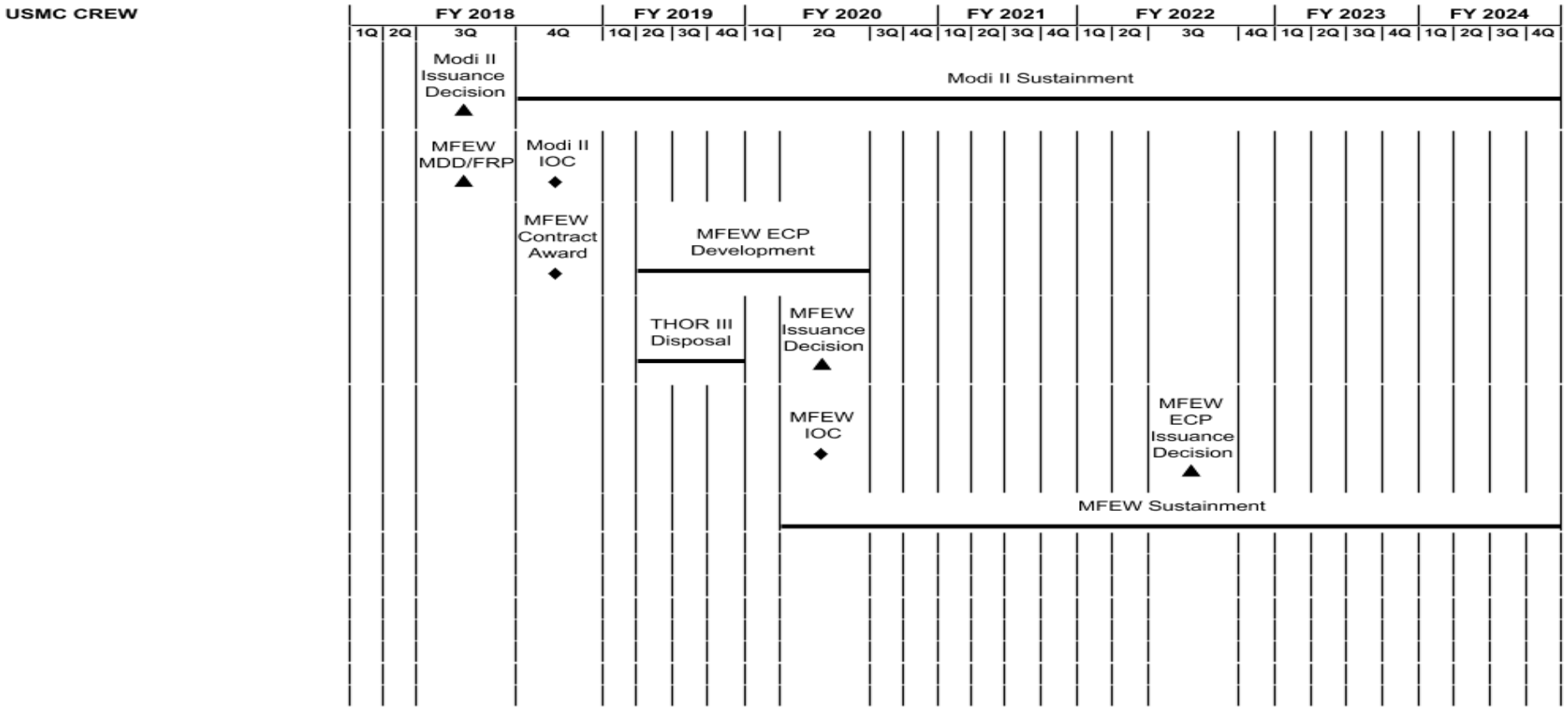

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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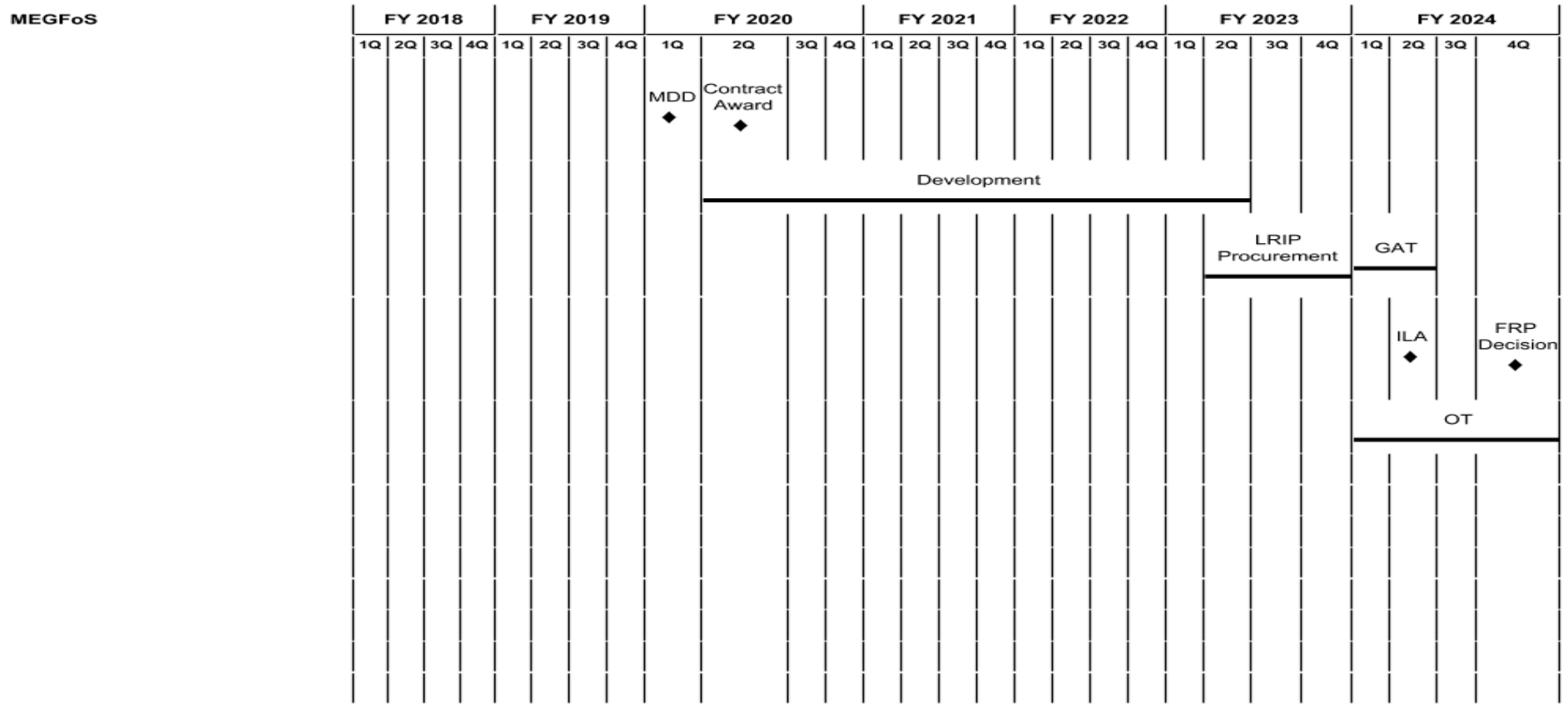

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2274 / *Command & Control Warfare Sys*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
USMC CREW				
Modi II Issuance Decision	3	2018	3	2018
Modi II Sustainment	4	2018	4	2024
Modi II IOC	4	2018	4	2018
MFEW MDD/FRP	3	2018	3	2018
MFEW Contract Award	4	2018	4	2018
MFEW ECP Development	2	2019	2	2020
THOR III Disposal	2	2019	4	2019
MFEW Issuance Decision	2	2020	2	2020
MFEW IOC	2	2020	2	2020
MFEW ECP Issuance Decision	3	2022	3	2022
MFEW Sustainment	2	2020	4	2024
MEGFoS				
MEGFoS MDD	1	2020	1	2020
MEGFoS Contract Award	2	2020	2	2020
MEGFoS Development	2	2020	2	2023
MEGFoS LRIP Procurement	2	2023	4	2023
MEGFoS GAT	1	2024	2	2024
MEGFoS ILA	2	2024	2	2024
MEGFoS FRP Decision	4	2024	4	2024
MEGFoS OT	1	2024	4	2024

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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2275: *Marine Corps Tactical Radio Systems*	60.097	20.994	23.288	13.348	-	13.348	15.176	14.604	17.551	17.892	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, COC funding has been realigned from project 2273 and Air Operations C2 Systems funding to this project. Realignment of efforts to new projects in FY19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

Tactical Communications Modernization (TCM): TCM supports the research, testing, and evaluation of non-developmental tactical voice and data radio systems for mounted and dismounted operations within all echelons of the Marine Air-Ground Task Force. The testing will ensure the communication systems are joint networking capable and support National Security Agency (NSA) Communications Security (COMSEC) Modernization requirements. The funding provides contracted engineering support, facility test support, and test reporting for multiple systems. These include the Mobile User Objective System (MUOS), High Frequency Radio II (HFR II), and Multi-Channel Radio Family of System (MCR FoS) (Multi-Channel Man Pack (MCMP) and Multi-Channel Handheld (MCHH)) radios, terminals, antennas, current systems requiring updates or obsolescence issues, and Joint Enterprise Network Manager (JENM).

Networking on the Move (NOTM): NOTM provides a robust command and control (C2) capability by integrating tactical data systems with on the move satellite communications (SATCOM) for a beyond line-of-sight ability that allows battlefield commanders to have uninterrupted two-way access to digital data, anywhere on the battlefield. NOTM provides Marine Air-Ground Task Force (MAGTF) commanders and staffs with full Common Operational Picture (COP) access, virtually unlimited situational awareness and a powerful ability to issue digital orders (fires, maneuver, planning) to GCE, ACE, and LCE units at all echelons while on-the-move or at-the-halt. NOTM also provides Marine units the capability to link with and extend Defense Information System Network (DISN) services; SIPRNet, NIPRNet, and Defense Switched Networks (DSN). Integrated full motion video (receipt and retransmission), tactical voice communications plus three options for secure wireless local area network (LAN) connectivity between staff members makes this amphibious capability a crucial asset to all elements of the MAGTF. The USMC currently has three variants depending on the transportation being used; the NOTM Ground Combat Vehicle (GCV), the NOTM Utility Task Vehicle, and the NOTM Airborne (NOTM-A).

Very Small Aperture Terminal (VSAT): The VSAT Family of Systems (FoS) provides wideband beyond-line-of-sight (BLOS), low-cost satellite communications to Marine Air-Ground Task Force (MAGTF) commanders at the Major Subordinate Commands to the Battalion levels. The VSAT FoS provides the RF communications link in support of the transfer of voice, video, and data services.

Secure Mobile Anti-Jam Reliable Tactical-Terminal (SMART-T): SMART-T is an Army led, ACAT II program. The Marine Corps SMART-T has fielded the full Authorized Acquisition Objective (AAO) of 42 terminals and 35 AN/PSQ-17 Network Planning tools and completed the Advanced Extremely High Frequency (AEHF) upgrades. The SMART-T is the only USMC asset that provides a SATCOM AEHF capability. Funding supports test and information efforts associated with component refresh.

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Terrestrial Wideband Transmission Systems (TWTS): TWTS is a capabilities portfolio that provides the Marine Air Ground Task Force (MAGTF) with a continued capability of secure terrestrial digital data transmission. The portfolio includes, the Army/Navy Transportable Radio Communications-170A (AN/TRC-170A) Beyond Line of Sight (BLOS) systems and their replacement Next Generation Troposcatter (NGT). The AN/MRC-142 and the Wireless Point to Point Link (WPPL) Line of Sight (LOS) systems and their replacement called the LOS Replacement (LOS-R), Tactical Elevated Antenna Mast (TEAMS), and Free-Space Optics (FSO) system. The NGT capability will provide a high bandwidth communications data link to support remote locations where satellite communication is not available. The LOS-R capability will provide a digital wideband full duplex link between operating units ashore and units aboard amphibious ships via the Navy's Automated Data Network System (ADNS) to meet ship-to-shore and shore-to-shore communication requirements. FSO is designed to provide additional LOS transmission diversity with an optical line-of-sight transmission path with a Low Probability of Detection/Low Probability of Intercept (LPD/LPI).

Combat Operations Center (COC): COC provides commanders with a rapidly deployable, common, modular, and scalable operational agency that facilitates command and control across the full spectrum of MAGTF operations. The AN/TSQ-239A Family of Systems (FoS), is designed to provide centralized C2 Operational Facilities (OPFAC) to collect, process, and disseminate tactical data for the commander and staff of a Marine Expeditionary Force (MEF), Division, Wing, Marine Logistics Group, Regiment, Marine Air Group, Battalion, and Squadron. The COC provides the commander with a Common Operational Picture (COP) and tactical data and communications assets needed to plan and conduct operations in an expeditionary combat environment. The system enables analytical and intuitive decision-making with a modular and scalable equipment set consisting of a common module OPFAC, C2 system, visual displays, and SW. Existing Tactical Data System software, previously resident on numerous platforms throughout the Marine Air Ground Task Force (MAGTF), have been re-hosted on the COC system to provide commanders with integrated data access and communications. COC transitioned from Project C2273 to Project C2275 beginning FY19.

The overall decrease of $9.94M is principally due the transition of NOTM from initial design, development, and prototyping to its refresh cycle.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: TCM: Product Development	1.482	1.118	1.256	0.000	1.256
Articles:	-	-	-	-	-
FY 2019 Plans: - Funding the Marine Corps fair share cost for development of the Joint Enterprise Network Manager (JENM) update release of 3.4 application and development of 3.5.					
FY 2020 Base Plans: - Will continue funding the Marine Corps fair share cost for development of the Joint Enterprise Network Manager (JENM) application required for MUOS.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
No significant change from FY 2019 to FY 2020.					
Title: TCM: Engineering and Program Support ***Articles:*** ***FY 2019 Plans:*** - Engineering and support efforts for radios such as HFR II and MCMP. ***FY 2020 Base Plans:*** - Engineering and support efforts for radios such as MCHH, and crypto modernization efforts. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.	0.266 -	0.335 -	0.342 -	0.000 -	0.342 -
Title: TCM: Test and Evaluation Support ***Articles:*** ***FY 2019 Plans:*** - Procurement of test assets and initiate test events for TCM Family of Systems (FoS), including Multi Channel Hand Held (MCHH) (formerly THHR Replacement on schedule). - Test events including software development test, road shock, shake and vibration testing and MIL-STD testing for TCM FoS, such as HFR II and Multi Channel Man Pack (MCMP) (formerly MBR Replacement). - Supports Mobile Objective User System (MUOS) test and evaluations events with JENM 3.5. ***FY 2020 Base Plans:*** - Procure test assets to support testing to mitigate obsolescence issues. - Test events including software development test, road shock, shake and vibration testing and MIL-STD testing for TCM FoS, such as HFR II, Multi Channel FoS, and system updates or obsolescence. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease from FY19 to FY20 of $0.362M reflects completion of MCHH test asset procurement.	2.703 -	3.082 -	2.966 -	0.000 -	2.966 -
Title: TCM: Management Services	0.706	0.386	0.386	0.000	0.386

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: - Will support FFRDC engineering and program support for the TCM Family of Systems (FoS), such as HFR II, MCR FoS, MBR II equipment and legacy equipment reaching obsolescence. ***FY 2020 Base Plans:*** - Will support FFRDC engineering and program support for the TCM Family of Systems (FoS), MCR FoS, MBR II equipment and legacy equipment reaching obsolescence. ***FY 2020 OCO Plans:*** N/A					
Title: NOTM: Product Development	6.433	5.869	0.902	0.000	0.902
Articles:	-	-	-	-	-
Description: Networking on the Move Research and Development funding supports the design, development, prototyping and Engineering for technology refresh and upgrades, system refreshes and new capabilities. ***FY 2019 Plans:*** - Complete design and development efforts focused on reducing SWaP parameters of the NOTM-GCV system. - Complete certification requirements associated with the NOTM GCV tri-band radome upgrade. - Initiate the Link 16 certification process in support of the NOTM GCV equipment upgrade. - Continue development efforts in support of NOTM UTV. ***FY 2020 Base Plans:*** - Complete development of NOTM UTV variant. - Continue Engineering Change Proposals (ECPs) associated with NOTM tech refreshes, equipment upgrades and usability enhancements of fielded systems. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $4.967M from FY19 to FY20 reflects transition from initial design, development, and prototyping for the NOTM UTV and SWaP to a technology refresh cycle.					
Title: NOTM: Test and Evaluation Support	2.779	0.687	0.159	0.000	0.159

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
Description: Networking on the Move Test and Evaluation funding supports acquisition testing for design, development, production, engineering and fielding of system variants and equipment upgrades. ***FY 2019 Plans:*** - Conduct testing and evaluation efforts in support of the NOTM GCV size, weight and power (SWaP) reduction. - Continue test and evaluation of NOTM-GCV tri-band radome. - Conduct testing and evaluation efforts in support of NOTM UTV. ***FY 2020 Base Plans:*** - Will conduct test and evaluation efforts in support of NOTM technology refreshes and equipment upgrades. - Will complete test and evaluation efforts in support of NOTM UTV. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.528M from FY19 to FY20 reflects the completion of the SWaP ECP and NOTM-UTV prototype and transition to a technology refresh cycle.					
Title: NOTM: Management Services	0.000	0.200	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: NOTM Management Services: Funds support management of NOTM variant requirements. ***FY 2019 Plans:*** - Initiates research efforts of servers and network capabilities. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.200M from FY19 to FY20 reflects transition to technology refresh cycle.					
Title: VSAT: Product Development	0.402	0.613	0.468	0.000	0.468

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue VSAT GUI Design and Development. - Initiate development efforts for the VSAT-M Replacement system. ***FY 2020 Base Plans:*** - Continues to support quarterly VSAT GUI design and development efforts to mitigate cyber-security vulnerabilities. - Procures Next Generation SATCOM test assets in preparation for developmental test in FY21. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $145K reflects completion of VSAT-M Replacement development efforts.					
Title: VSAT: Test and Evaluation	0.152	2.495	1.350	0.000	1.350
Articles:	-	-	-	-	-
FY 2019 Plans: - Procurement of VSAT-M Replacement system test asset. ***FY 2020 Base Plans:*** - Will complete remaining 20% of VSAT-M Refresh testing events. - Initiate test and evaluation efforts, such as test plans, for Next Generation SATCOM. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $1.145M from FY19 to FY20 is due to the completion of procurement of VSAT-M Refresh test assets and 80% of VSAT-M Refresh testing events.					
Title: VSAT: Engineering and Program Support	0.266	0.201	0.201	0.000	0.201
Articles:	-	-	-	-	-
FY 2019 Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue ECPs in support of modem upgrades and development efforts focusing on Next Generation SATCOM. ***FY 2020 Base Plans:*** - Continue ECPs in support of modem upgrades and development efforts for Next Generation SATCOM. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** N/A					
Title: VSAT: Management Services ***Articles:*** ***FY 2019 Plans:*** - Continue engineering efforts through a FFRDC in support of analysis of requirements and research to mitigate end-of-life/end-of-sale, and component obsolescence. ***FY 2020 Base Plans:*** - Continue engineering efforts through a FFRDC in support of analysis of requirements and research to mitigate end-of-life/end-of-sale, and component obsolescence. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY19 to FY20.	0.946 -	0.079 -	0.055 -	0.000 -	0.055 -
Title: SMART-T: Engineering and Program Support ***Articles:*** ***FY 2019 Plans:*** - Continue to fund ECPs and Information Assurance support efforts. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:***	0.000 -	0.083 -	0.000 -	0.000 -	0.000 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The United States Marine Corps (USMC) decided to terminate the SMART-T program in order to better align to the National Defense Strategy.					
Title: SMART-T: Management Services	0.180	0.099	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to provide engineering analysis through a FFRDC on potential future technical upgrades and research to mitigate end-of-life/end-of-sale, and component obsolescence. ***FY 2020 Base Plans:*** - Continue to provide engineering analysis through a FFRDC on future technical upgrades and research to mitigate end-of-life/end-of-sale, and component obsolescence. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The United States Marine Corps (USMC) decided to terminate the SMART-T program in order to better align to the National Defense Strategy.					
Title: TWTS: Product Development	1.199	0.078	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: - Complete sustainment ECP development for AN/MRC-142D. ***FY 2020 Base Plans:*** - N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $.078M from FY19 to FY20 reflects completion of sustainment ECP for AN/MRC-142D.					
Title: TWTS: Engineering and Program Support	2.064	1.953	0.200	0.000	0.200

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to fund program management, engineering and information assurance support for the Next Generation Tropo (NGT) systems and TWTS Family of Systems (FoS). ***FY 2020 Base Plans:*** - Continue to fund Program office management support. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $1.753M from FY19 to FY20 reflects completion of TWTS Engineering and Information assurance support.					
Title: TWTS: Test and Evalution Support	0.891	0.622	0.686	0.000	0.686
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue with test and evaluation events to support Next Generation Tropo (NGT) and Line Of Sight Replacement (LOS R). ***FY 2020 Base Plans:*** - Ramp up of test and evaluation efforts related to Next Generation Tropo (NGT) and Line of Sight Replacement (LOS-R) developmental test. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $.64M from FY19 to FY20 is due to an increase in testing starting in FY20.					
Title: TWTS: Management Services	0.525	0.325	0.105	0.000	0.105
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue engineering and program support for TWTS FoS. ***FY 2020 Base Plans:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $.22M from FY19 to FY20 reflects reduction of TWTS MITRE engineering support to align with transition to production for NGT.					
Title: COC: Product Development ***Articles:*** ***FY 2019 Plans:*** - Continue testing and software integration efforts needed to align with other C2 systems. ***FY 2020 Base Plans:*** - Will continue testing and integration efforts for tactical wireless capability and cyber intrusion to meet readiness and warfighting requirements. - Initiate testing, integration, and network interoperability for network and table top switch replacement. - Initiate an internal communications systems re-design and evaluate a new solution for the internal communication system to address intercom noise hazardous issues. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.747M from FY19 to FY20 due to additional testing and integration efforts, tactical wireless, and server refresh.	0.000 -	2.525 -	3.272 -	0.000 -	3.272 -
Title: COC: Management Services ***Articles:*** ***FY 2019 Plans:*** - Continue engineering support for system optimization and system enhancements. ***FY 2020 Base Plans:***	0.000 -	2.538 -	1.000 -	0.000 -	1.000 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Will continue engineering support for system optimization and system enhancements to provide the ability for COC to operate with present and future MAGTF operations. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $1.538M from FY19 to FY20 reflects transition of management services cost to Operation and Maintenance.					
Accomplishments/Planned Programs Subtotals	20.994	23.288	13.348	0.000	13.348

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4633-1: *TCM*	19.718	204.285	164.165	-	164.165	284.999	277.097	287.568	293.335	Continuing	Continuing
• PMC/4631-1: *NOTM*	117.014	92.669	79.373	-	79.373	33.034	14.354	14.929	15.227	Continuing	Continuing
• PMC/4633-2: *VSAT*	7.044	7.567	15.957	-	15.957	14.490	14.951	18.931	19.306	Continuing	Continuing
• PMC/4633-3: *SMART-T*	0.549	0.571	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/4633-4: *TWTS*	0.060	36.643	37.469	-	37.469	56.232	212.979	208.820	213.008	Continuing	Continuing
• PMC/7000: *SMART-T Spares*	0.205	0.207	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/4631-2: *COC*	16.185	5.768	8.440	-	8.440	12.123	12.365	16.005	16.318	Continuing	Continuing
• RDTE/C2273: *COC*	2.410	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.935

Remarks

D. Acquisition Strategy

Tactical Communications Modernization (TCM): TCM will maximize the use of non-developmental radio solutions to meet the next generation of Marine Corps tactical radio requirements. The Mobile User Objective System (MUOS)testing at contracted government test labs to include environmental, shock, electromagnetic compatibility, and interoperability testing until full capability is completed. Due to NSA Type 1 COMSEC capability requirement, High Frequency Radios II (HFR II) is limited on vendor opportunities. The contracting strategy is sole-source to a qualified NSA vendor. The validation of Military and Marine Corps Standards will be tested and will be completed before procurement. The MCR FoS will be an evolutionary program with upgrades to radio software and hardware based capabilities throughout the lifecycle. To maximize better buying power, reduce lifecycle cost, and enhance interoperability, the MCR FoS will engage in a cooperative acquisition with the United States Army (USA) Program Executive Office - Command, Control, and Communications-Tactical (PEO C3T), Program Manager Tactical Radios Handheld, Manpack

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and Small Form Fit Program. MCR FoS will leverage programmatic documentation and contracts under PEO-C3T in order to meet the material solution for the MCMP and MCHH, reduce duplication of effort and meet future sustainment requirements.

Networking on the Move (NOTM): NOTM will use an evolutionary acquisition strategy that leverages Commercial-Off-The-Shelf (COTS) and Government-Off-The-Shelf (GOTS) technology to procure, sustain, and meet emerging requirements. The design of the system provides for internal growth capability through an open system architecture enabling technology refresh to extend the system's life, maintain interoperability, Information Assurance (IA) compliance, and reduce costs due to Diminishing Manufacturing Sources and Material Shortages (DMSMS). It is envisioned that technology refresh will occur on the NOTM hardware and software periodically due to component obsolescence, user-driven requests for improvements, IA compliance, and mission-related requirements. Refresh will include investments to incorporate evolving capabilities to ensure compatibility with other systems, create lighter and more efficient equipment, and keep pace with evolving software requirements. End-of-life equipment refresh is expected throughout the program's life cycle and may be managed through kit purchases, replacement through Engineering Change Proposals (ECPs), or as replacement parts as equipment is repaired.

Very Small Aperture Terminal (VSAT): The VSAT Family of Systems (FoS) was fielded over 10 years and as a result, many subcomponents have reached End-of-Life/End-of-Sale (EoL/EoS). The VSAT program will conduct a VSAT-Medium refresh to bridge the gap between current obsolescence and Next Generation SATCOM development. The VSAT acquisition strategy leverages Commercial-Off-The-Shelf (COTS) technology to keep the systems relevant and capable. The design of Next Generation SATCOM is intended to be scalable and utilize like subcomponents to minimize sustainment costs and equipment readiness issues. Refreshes will be required periodically through the life of the program due to equipment obsolescence, user requirements, and IA compliance, which will be conducted through the Engineering Change Proposal (ECP) process.

Secure Mobile Anti-Jam Reliable Tactical-Terminal (SMART-T): SMART-T is an Army led, ACAT II program. The Marine Corps SMART-T has fielded the full Authorized Acquisition Objective (AAO) of 42 terminals and 35 AN/PSQ-17 Network Planning tools and completed the Advanced Extremely High Frequency (AEHF) upgrades. The SMART-T Project Office will procure non developmental items utilizing an Army contract to mitigate obsolescence, Diminishing Manufacturing Sources and Material Shortages (DMSMS), and components whose warranty has expired. This strategy will continue until a NEXGEN AEHF solution is identified.

Terrestrial Wideband Transmission Systems (TWTS): TWTS is a capabilities portfolio that includes Beyond Line of Sight (BLOS) system and Line of Sight (LOS) systems. The AN/TRC-170A BLOS is a vehicle mounted self-enclosed troposcatter terminal fielded in 1992 and will be replaced by the Next Generation Troposcatter (NGT) transit case solution capable of providing 900% capacity increase, decrease size, and frequency diversity over the current system. The AN/MRC-142 Family of Systems (FoS) is the current LOS system that provides two-way, secure voice and data communications up to 35 miles. The AN/MRC-142 FOS will be replaced by the LOS replacement (LOS-R) system providing radio compatibility with the Army and Navy for these high capacity LOS communication systems.

Combat Operations Center (COC): The COC AN/TSQ-239 (V)1-4 is the foundation of USMC Command and Control (C2), meeting near term communications and network requirements across the OpFor. There is a continuing developmental effort to evolve the COC into a fully integrated MAGTF C2 capability to maintain industry standard and interoperability with disparate C2 systems across the joint forces.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TCM JENM Development	SS/CPFF	ARL : Aberdeen, MD	2.038	1.407	Feb 2018	1.118	Feb 2019	1.121	Feb 2020	-		1.121	0.000	5.684	-
TCM FoS LCCEs	C/IDIQ	MCSC : Quantico, VA	0.035	0.075	Sep 2018	0.000		0.135	Jul 2020	-		0.135	0.000	0.245	-
NOTM Development/ Enhancement	WR	SSC-LANT2: : Charleston, SC	0.000	0.000		1.200	Apr 2019	0.000		-		0.000	0.000	1.200	-
NOTM Development/ Enhancement	MIPR	DLA : Philadelphia, PA	0.000	1.598	Jun 2018	0.800	Mar 2019	0.000		-		0.000	0.000	2.398	-
NOTM Development/ Enhancement	C/FFP	MCTSSA: : Camp Pendleton, CA	0.000	0.000		0.200	Jan 2019	0.200	Jan 2020	-		0.200	0.000	0.400	-
NOTM Development	C/CPFF	SSC-LANT : Charleston, SC	2.354	1.393	May 2018	0.200	Jan 2019	0.200	Feb 2020	-		0.200	0.000	4.147	-
NOTM Development	WR	SSC-Pacific : San Diego, CA	1.559	1.072	Feb 2018	2.519	May 2019	0.502	Dec 2019	-		0.502	Continuing	Continuing	Continuing
NOTM-A	WR	SSC-Atlantic : Charleston, SC	1.497	0.000		0.250	Apr 2019	0.000		-		0.000	0.000	1.747	-
NOTM-UTV	WR	DTIC : Fort Belvoir, VA	0.000	1.579	Apr 2018	0.000		0.000		-		0.000	0.000	1.579	-
NOTM Production Enchancement	MIPR	DTIC : Fort Belvoir, VA	0.000	0.791	Jun 2018	0.700	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing
VSAT GUI Development	C/FFP	CECOM : Aberdeen, MD	0.618	0.402	Jul 2018	0.613	Jun 2019	0.468	Jun 2020	-		0.468	0.000	2.101	-
TWTS ARMY NGT SYSTEM	TBD	CECOM : Aberdeen, MD	0.000	0.817	Jan 2019	0.000		0.000		-		0.000	0.000	0.817	-
TWTS ECP Development	WR	SSC-Lant : Charleston, SC	0.000	0.382	Jul 2018	0.078	Feb 2019	0.000		-		0.000	0.000	0.460	-
COC	WR	SSC-Lant : Charleston, SC	0.000	0.000		1.453	May 2019	1.338	May 2020	-		1.338	0.000	2.791	-
COC	WR	NSWC2 : Dahlgren, VA	0.000	0.000		0.600	May 2019	0.000		-		0.000	0.000	0.600	-
COC	C/CPIF	NSWC : Dahlgren, VA	0.000	0.000		0.200	May 2019	0.000		-		0.000	0.000	0.200	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2275 / *Marine Corps Tactical Radio Systems*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
COC	C/CPIF	SSC-Lant2 : Charleson, SC	0.000	0.000		0.272	May 2019	1.934	May 2020	-		1.934	0.000	2.206	-
Prior Years Cumulative Funding	Various	Various : Various	15.057	0.000		0.000		0.000		-		0.000	0.000	15.057	-
		Subtotal	23.158	9.516		10.203		5.898		-		5.898	Continuing	Continuing	N/A

Remarks

COC realigned from Project C2273 to C2275 starting in FY19.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TCM Engineering Support	Various	MCSC : Quantico, VA	0.059	0.266	May 2018	0.335	Sep 2019	0.342	May 2020	-		0.342	Continuing	Continuing	Continuing
VSAT Engineering Support	WR	SSC-PAC : San Diego, CA	0.491	0.266	Feb 2018	0.201	Feb 2019	0.201	Feb 2020	-		0.201	Continuing	Continuing	Continuing
SMART-T Engineering Support	WR	SSC-LANT : Charleston, SC	0.304	0.000		0.083	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing
TWTS Program Management Support	Various	MCSC : Quantico, VA	0.841	0.742	May 2018	0.445	May 2019	0.200	May 2020	-		0.200	Continuing	Continuing	Continuing
TWTS Engineering Support	WR	SSC-LANT : Charleston, SC	0.000	1.057	Apr 2018	1.334	Jan 2019	0.000		-		0.000	0.000	2.391	-
TWTS IA Support	WR	NSWC : Indian Head, MD	0.000	0.250	May 2018	0.174	Feb 2019	0.000		-		0.000	0.000	0.424	-
TWTS NGT CARD/LCCE Cost Analysis	TBD	MCSC : Quantico, VA	0.000	0.015	Aug 2018	0.000		0.000		-		0.000	0.000	0.015	-
Prior Years Cumulative Funding	Various	Various : Various	1.516	0.000		0.000		0.000		-		0.000	0.000	1.516	-
		Subtotal	3.211	2.596		2.572		0.743		-		0.743	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2275 / *Marine Corps Tactical Radio Systems*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

SMART-T Support: FY2020 - The USMC decided to terminate the Secure Mobile AntiJam Reliable-Tactical program in order to better align with the National Defense Strategy.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TCM FoS Test Activities	TBD	TBD : TBD	0.000	1.722	Aug 2018	1.692	Aug 2019	1.805	Aug 2020	-		1.805	Continuing	Continuing	Continuing
TCM T&E Support	MIPR	DHHS : Bethesda, MD	0.121	0.000		0.290	Mar 2019	0.293	Mar 2020	-		0.293	0.000	0.704	-
TCM FoS Test Assets	C/IDIQ	PRP : San Diego, CA	0.000	0.981	Sep 2018	1.100	Jul 2019	0.868	Feb 2020	-		0.868	0.000	2.949	-
NOTM Vehicle Integration Testing	WR	SSC-LANT : Charleston, SC	1.546	1.009	Jun 2018	0.200	Apr 2019	0.000		-		0.000	Continuing	Continuing	Continuing
NOTM-A Testing	WR	NSWC Crane : Crane, IN	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
NOTM-A Testing	WR	SSC PAC : San Diego, CA	0.000	1.361	May 2018	0.000		0.159	May 2020	-		0.159	0.000	1.520	-
NOTM EOL	C/CPFF	SSC_LANT : Charleston, SC	0.236	0.000		0.200	Apr 2019	0.000		-		0.000	0.000	0.436	-
NOTM Testing	MIPR	SSC-PAC : Hawaai	0.000	0.409	Jun 2018	0.287	May 2019	0.000		-		0.000	0.000	0.696	-
VSAT Testing	MIPR	TBD : TBD	0.094	0.152	Nov 2018	2.495	Jan 2019	1.350	Apr 2020	-		1.350	Continuing	Continuing	Continuing
TWTS T&E Support	C/FFP	Dept. of Human Health and Services : Rockville, MD	0.222	0.891	Apr 2018	0.622	Mar 2019	0.686	Mar 2020	-		0.686	Continuing	Continuing	Continuing
Prior Years Cumulative Funding	Various	Various : Various	19.671	0.000		0.000		0.000		-		0.000	0.000	19.671	-
		Subtotal	21.890	6.525		6.886		5.161		-		5.161	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TCM Engineering Support	FFRDC	US Army, MITRE : Stafford, VA	0.533	0.706	May 2018	0.386	Aug 2019	0.386	Dec 2019	-		0.386	0.000	2.011	-
NOTM Engineering Support	FFRDC	US Army, MITRE : Stafford, VA	0.000	0.000		0.200	Dec 2018	0.000		-		0.000	0.000	0.200	-
VSAT Engineering Support	FFRDC	US Army, MITRE : Stafford, VA	5.069	0.946	Sep 2018	0.079	Feb 2019	0.055	Feb 2020	-		0.055	0.000	6.149	-
SMART-T Engineering Support	FFRDC	US Army, MITRE : Stafford, VA	0.167	0.180	Feb 2018	0.099	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
TWTS Engineering Support	FFRDC	US Army, MITRE : Stafford, Va	0.371	0.525	Sep 2018	0.325	Jan 2019	0.105	Jan 2020	-		0.105	0.000	1.326	-
COC Engineering Support	FFRDC	US Army, MITRE : Stafford, VA	0.000	0.000		2.538	Feb 2019	1.000	Feb 2020	-		1.000	Continuing	Continuing	Continuing
Prior Year Cumulative Funding	FFRDC	US Army, MITRE : Stafford, VA	5.698	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	11.838	2.357		3.627		1.546		-		1.546	Continuing	Continuing	N/A

Remarks

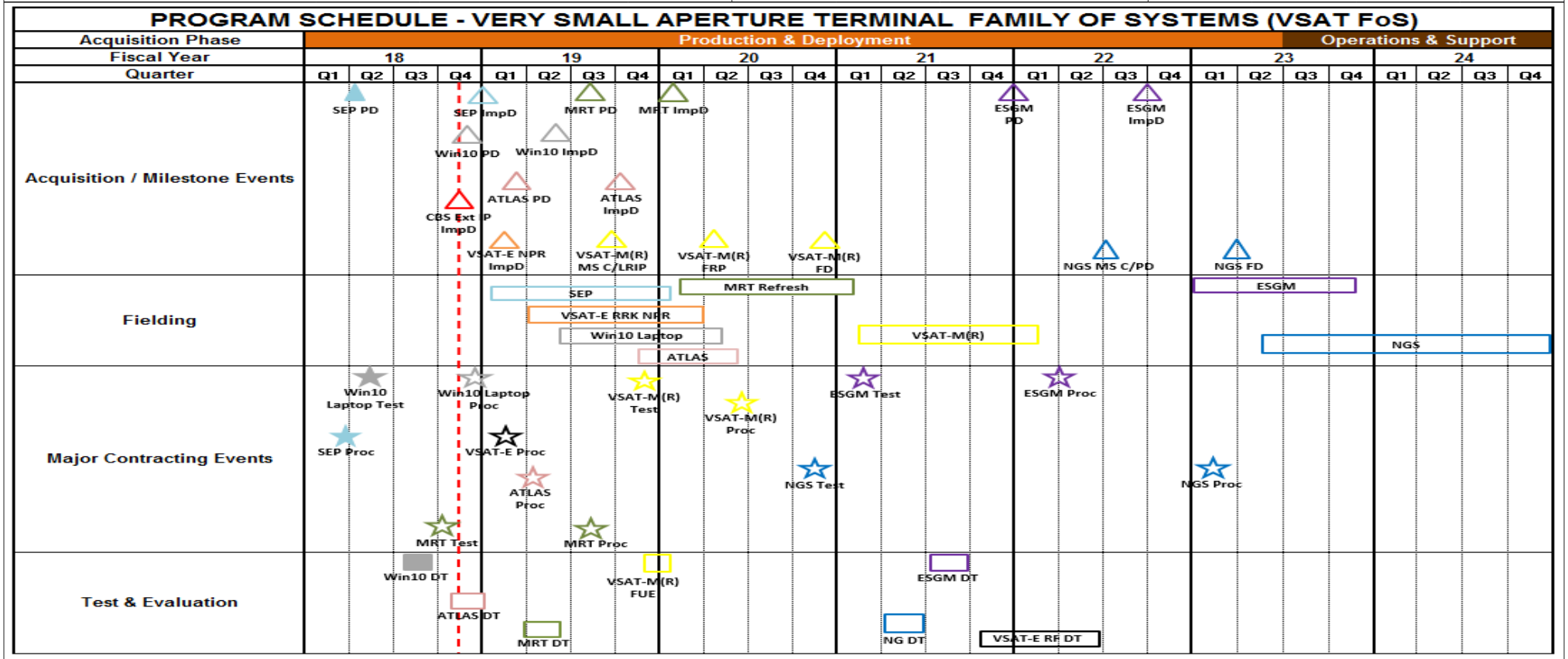
COC realigned from Project C2273 to C2275 starting in FY19.
SMART-T Management Services: FY2020 - The USMC decided to terminate the Secure Mobile AntiJam Reliable-Tactical program in order to better align with the National Defense Strategy.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	60.097	20.994		23.288		13.348		-		13.348	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

PROGRAM SCHEDULE - VERY SMALL APERTURE TERMINAL FAMILY OF SYSTEMS (VSAT FoS)



ATLAS: Adaptable Tactical Lightweight Antenna System (formerly VSAT ISA)
ESGM: Enterprise Satellite Gateway Modem
FD: Fielding Decision
ImpD: Implementation Decision
MRT: Master Reference Terminal
NGS: Next Generation SATCOM
NP: Network Package
PD: Procurement Decision
SEP: Signal Entry Panel (VSAT Large)

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

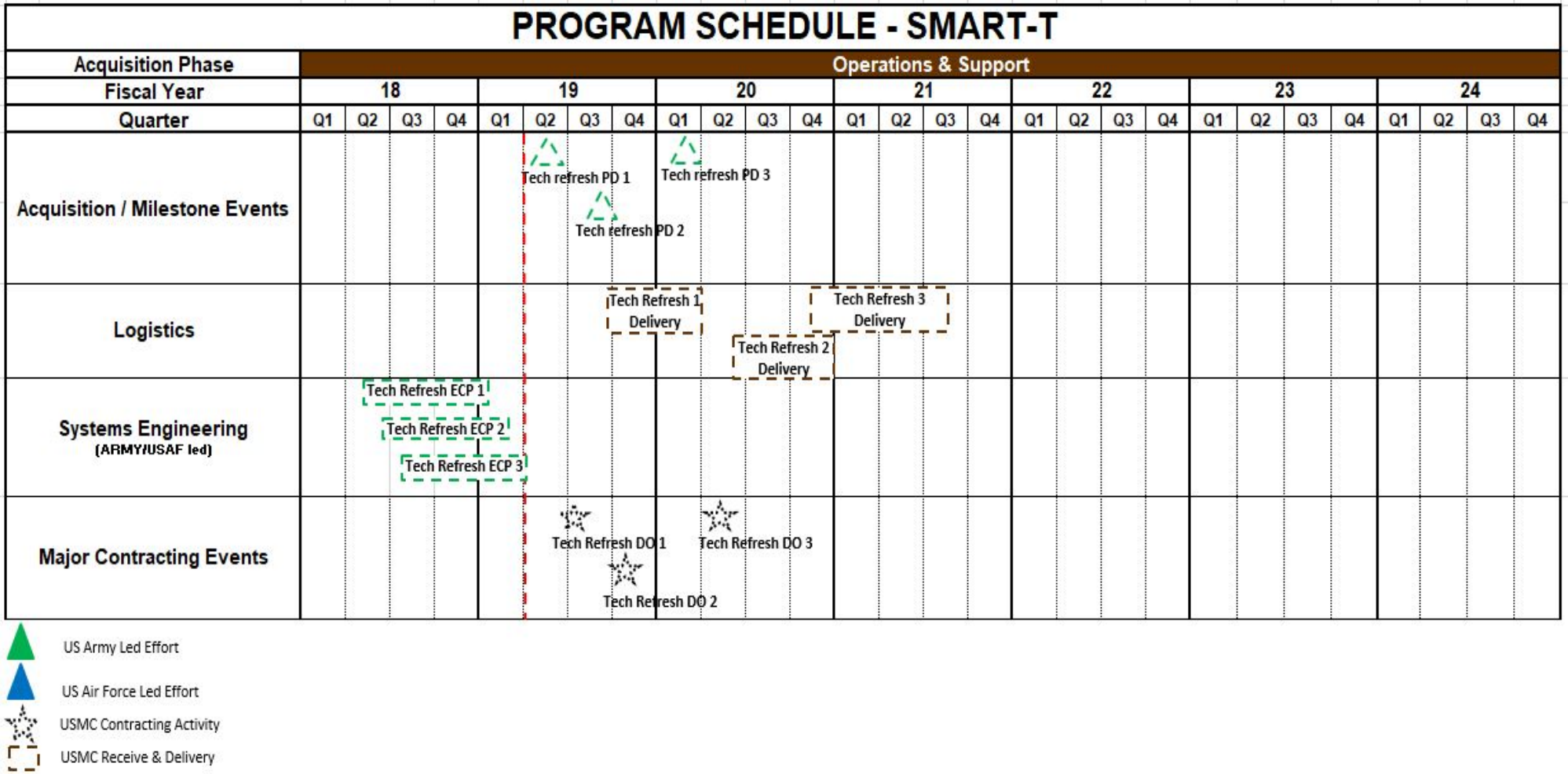
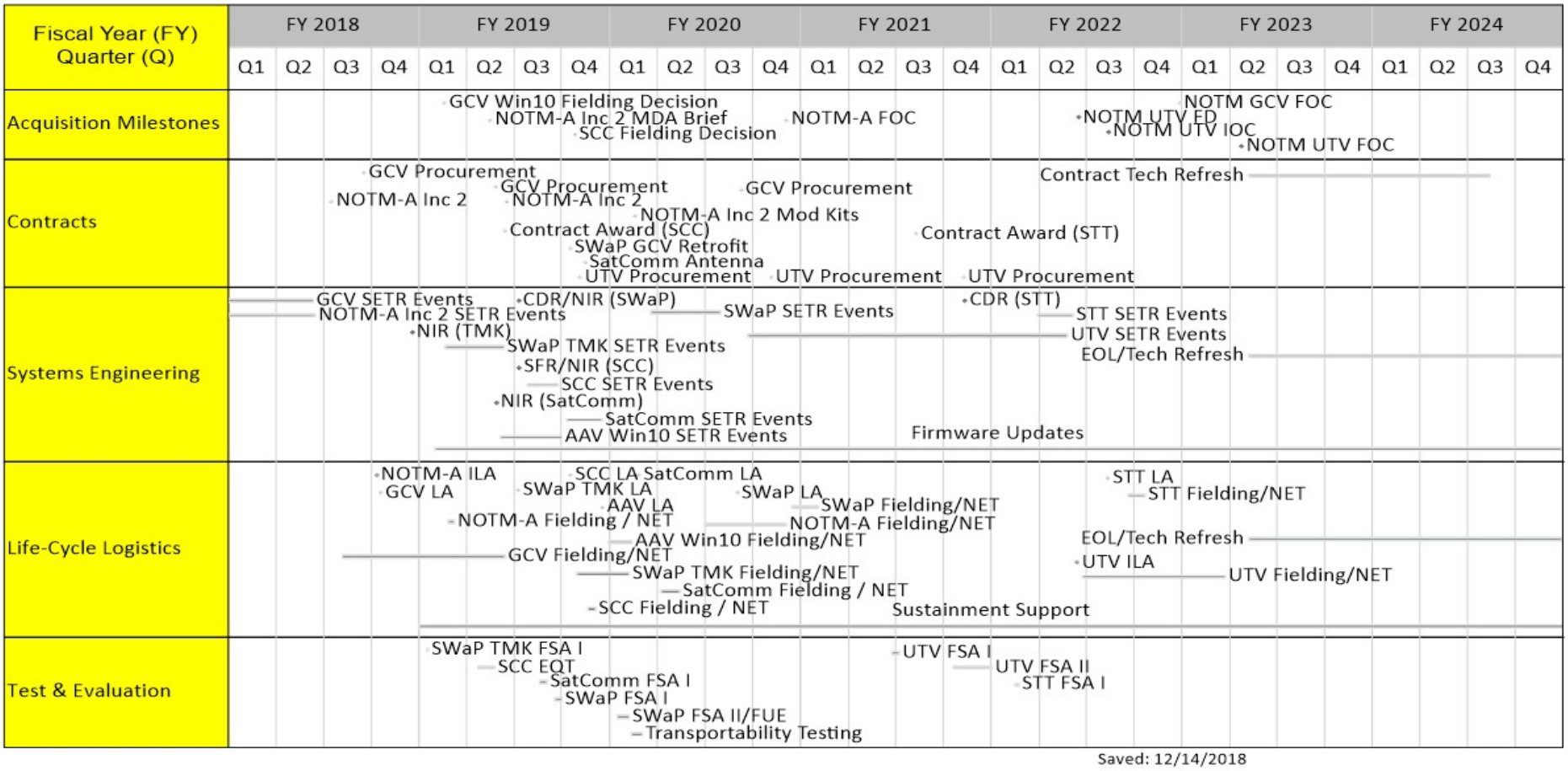


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

NOTM PB19 IMS



Saved: 12/14/2018

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

Combat Operations Center (COC) Program Schedule

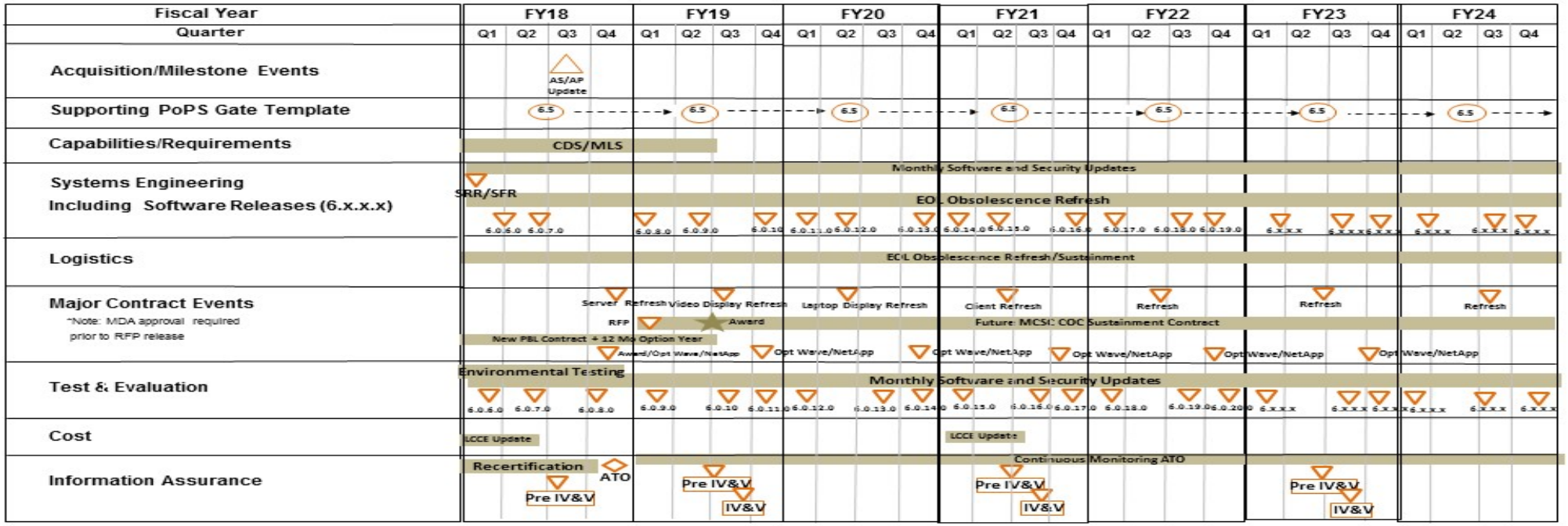


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

TCM - MBR II Schedule

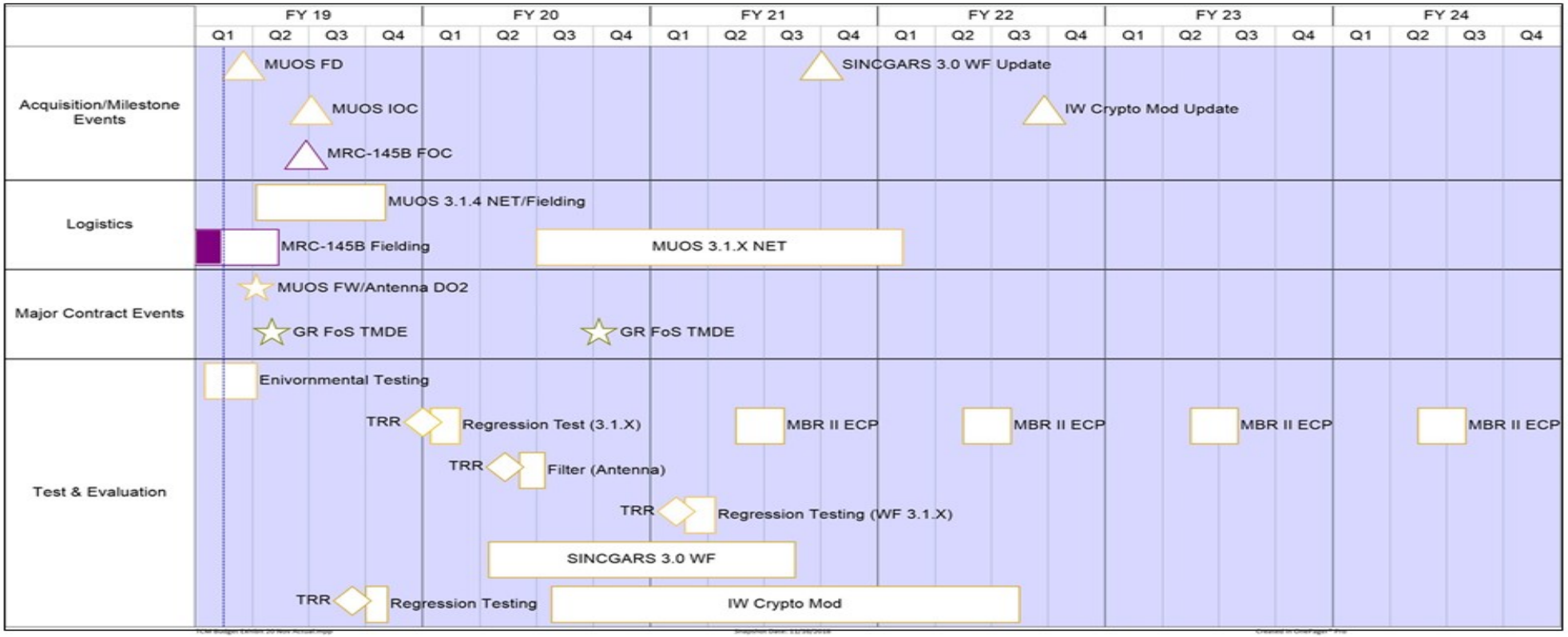


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

TCM - HFR II Program Schedule

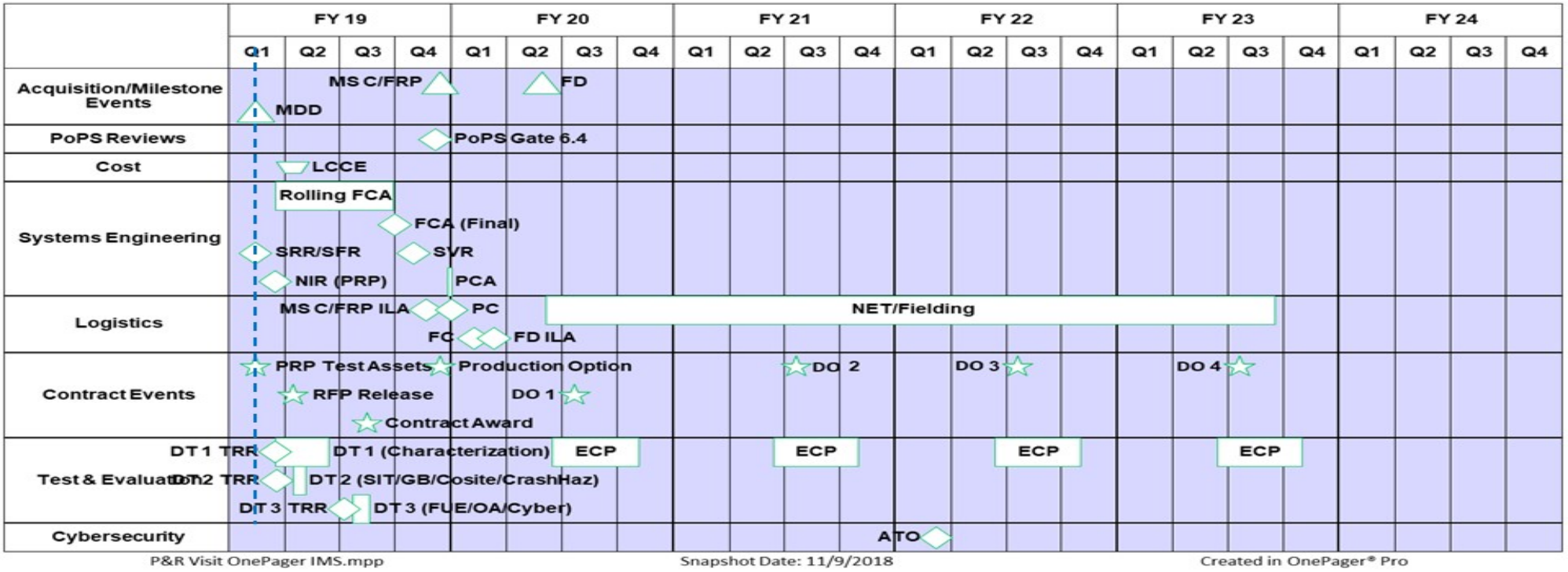
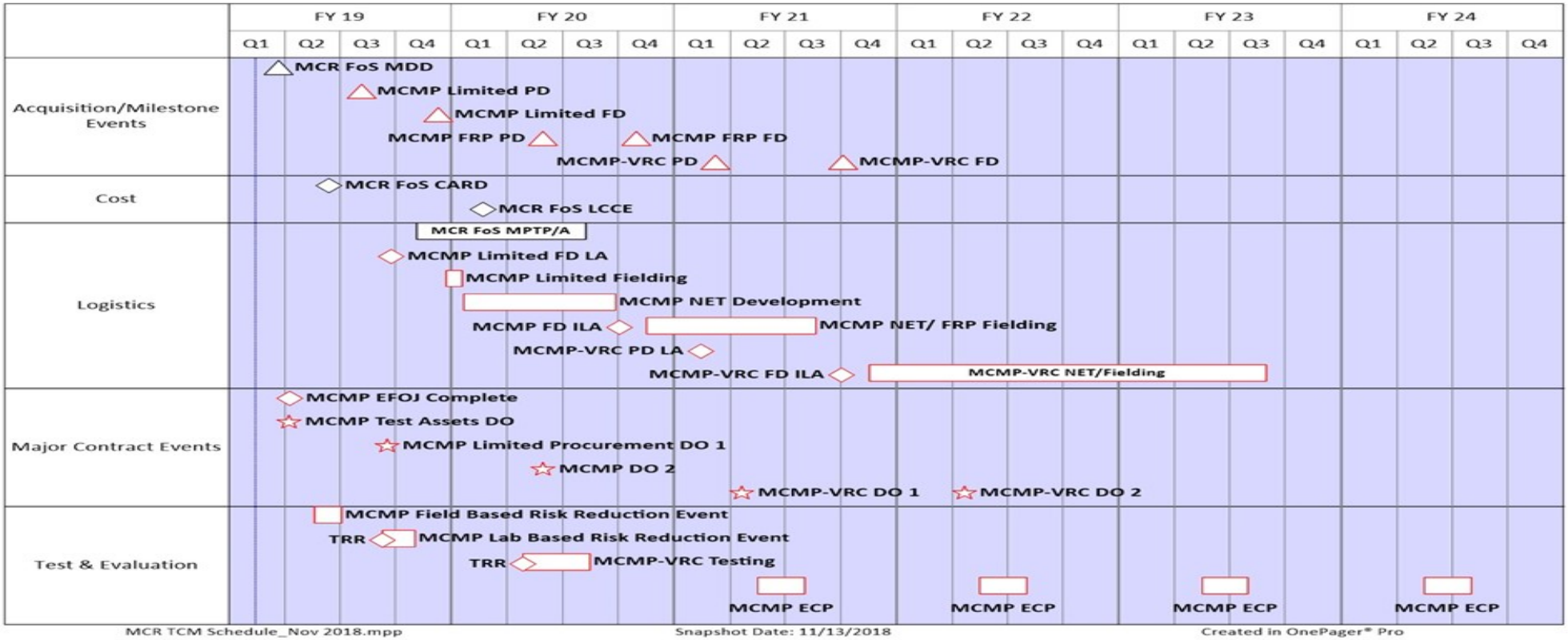


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

TCM - MCMP Schedule



MCR TCM Schedule_Nov 2018.mpp Snapshot Date: 11/13/2018 Created in OnePager® Pro

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

TCM - MCHH Schedule

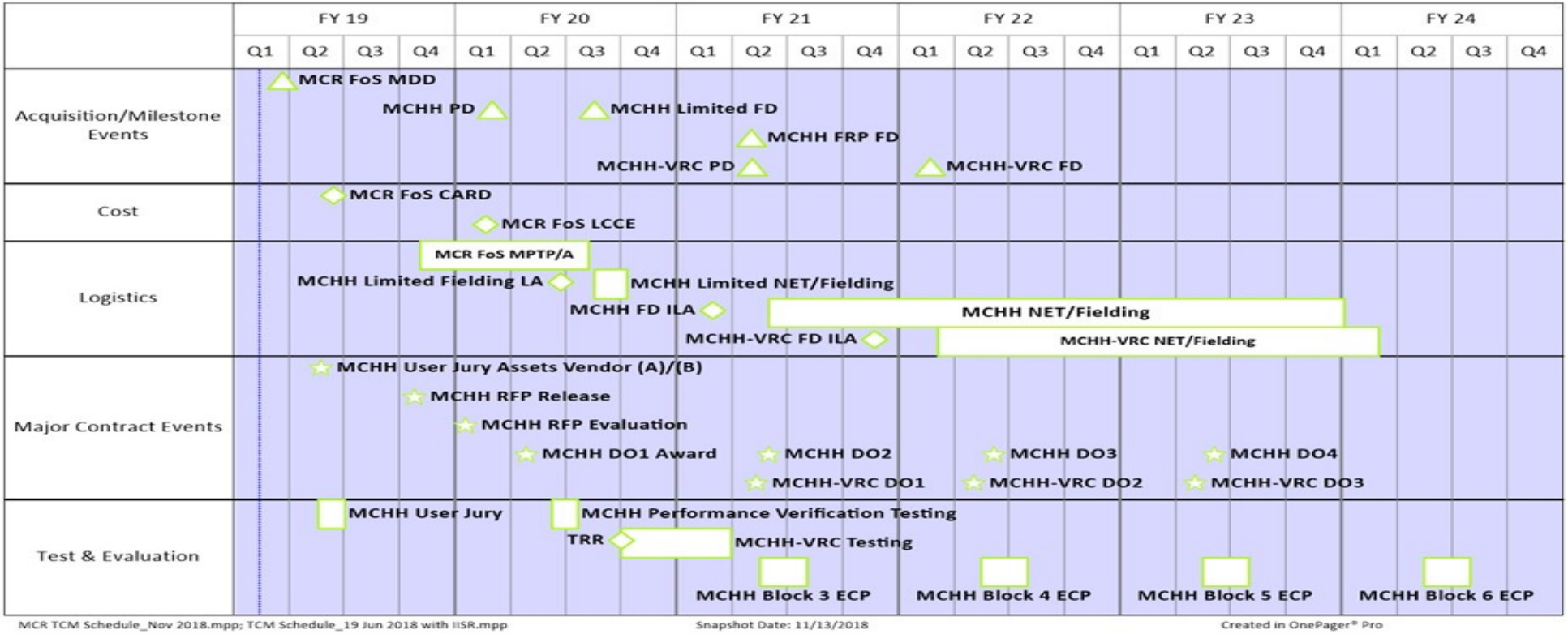


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

THC2 Portfolio

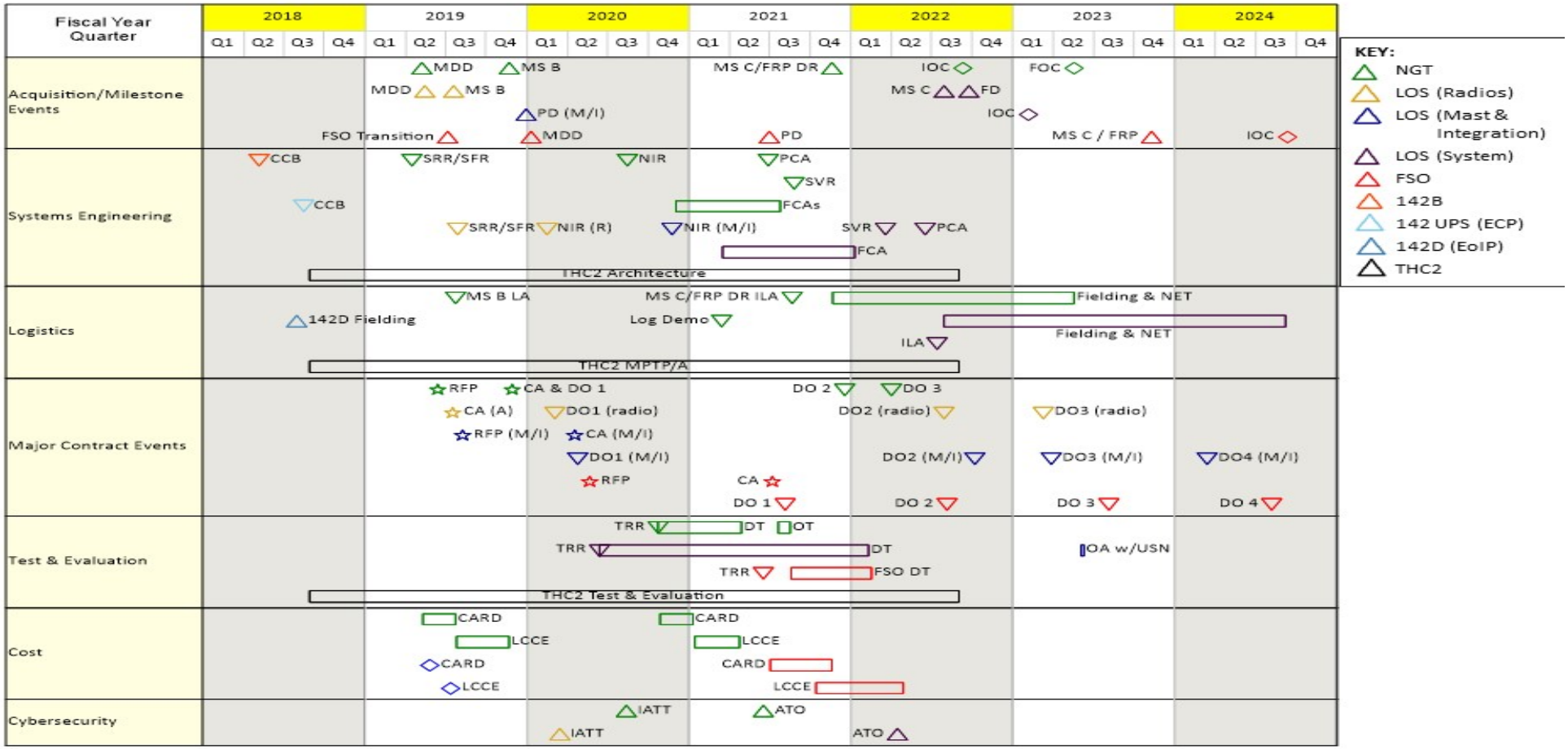


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2275				
TCM MBR II MRC-145B IOC	2	2018	2	2018
TCM MBR II MUOS Procurement Decision	3	2018	3	2018
TCM MBR II MUOS Contract Award	3	2018	3	2018
TCM HFR II Test Assets Contract Award	2	2019	2	2019
TCM MBR II MUOS Contract Award #2	1	2019	1	2019
TCM MBR II MUOS Fielding Decision	1	2019	1	2019
TCM MCMP Test Assets	2	2019	2	2019
TCM MBR II MUOS IOC	3	2019	3	2019
TCM MBR II AN/MRC 145B FOC	3	2019	3	2019
TCM MCMP PD / Contract Award DO#1	3	2019	3	2019
TCM HFR II Contract Award EMD	3	2019	3	2019
TCM HFR II Procurement Decision	4	2019	4	2019
TCM HFR II Contract Award (Production Mod)	4	2019	4	2019
TCM MCMP Contract Award DO #2	2	2020	2	2020
TCM MCHH Procurement Decision	1	2020	1	2020
TCM MCMP Fielding Decision	4	2020	4	2020
TCM HFR II MP Fielding Decision	2	2020	2	2020
TCM MCHH Contract Award DO #1	2	2020	2	2020
TCM HFR II Contract Award DO #1	3	2020	3	2020
TCM MCHH Fielding Decision	2	2021	2	2021
VSAT Inflatable Satellite Antenna (ATLAS) Procurement	2	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
VSAT WIN 10 Fielding	2	2019	2	2020
VSAT-E Network Package Refresh Fielding	2	2019	1	2020
VSAT MRT Procurement	3	2019	3	2019
VSAT VSAT-M Replacement MS C/LRIP	3	2019	3	2019
VSAT VSAT-M Replacement Test Asset Procurement	4	2019	4	2019
VSAT VSAT-M Replacement Testing	4	2019	1	2020
VSAT Inflatable Satellite Antenna (ATLAS) Fielding	4	2019	2	2020
VSAT MRT Implementation Decision	1	2020	1	2020
VSAT MRT Fielding	1	2020	1	2021
VSAT VSAT-M Replacement Procurement	2	2020	2	2020
VSAT Next Generation Test Asset	4	2020	4	2020
SMART-T Tech Refresh 1	3	2019	3	2019
SMART-T Tech Refresh 2	4	2019	4	2019
SMART-T Tech Refresh 3	2	2020	2	2020
NOTM GCV WIN10 Fielding Decision	1	2019	1	2019
NOTM-A Inc 2 MDA	2	2019	2	2019
NOTM Secure Communications Control Fielding	4	2019	4	2019
NOTM-A FOC	4	2020	4	2020
NOTM-UTV Fielding Decision	2	2022	2	2022
NOTM UTV IOC	3	2022	3	2022
TWTS Line Of Sight (LOS)-R MS B	3	2019	3	2019
TWTS NGT MS B	4	2019	4	2019
TWTS NGT Contract Award	4	2019	4	2019
TWTS LOS-R Radios Contract Award (Army)	3	2019	3	2019
TWTS LOS-R Radios Delivery Order 1 (DO 1)	2	2020	2	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2275 / *Marine Corps Tactical Radio Systems*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
TWTS LOS-R Mast & Integration Contract Award & DO 1	2	2020	2	2020
COC IV&V	3	2019	3	2019
COC Video Display Refresh	3	2019	3	2019
COC Opt Wave/NetApp	4	2019	4	2019
COC Software Releases 6.0.11.0	1	2020	1	2020
COC Software Releases 6.0.12.0	2	2020	2	2020
COC Laptop Display Refresh	2	2020	2	2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2276 / *Comms Switching and Control Sys*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2276: *Comms Switching and Control Sys*	44.494	2.068	1.675	1.778	-	1.778	1.815	1.653	1.686	1.719	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

(U) Network Planning & Management (NPM) is a portfolio of communications planning and Network Management applications for use throughout the Marine Air-Ground Task Force (MAGTF). NPM consists of items such as the Systems Planning Engineering and Evaluation Device (SPEED). NPM provides the Marine Forces (MARFOR) component planners with the ability to conduct high-level planning; detailed planning and engineering; monitoring; control and reconfiguration; and spectrum planning and management in support of Combatant Commander (COCOM) and Commander, Joint Task Force (CJTF) operations. SPEED provides High Frequency (HF) predictions, Line of Site (LOS) propagation, Radio Coverage Analysis (RCA), Satellite Planning, Command and Control Personal Computer (C2PC) track interface, interference and de-confliction analysis, spectrum management, Radio Guard Charts, Comm-On-The-Move (COTM), and T/E (training & education) and force structure management. Program transitioned to sustainment in FY19.

(U) Tactical Voice Switching System (TVSS): The TVSS is a modular Integrated Services Digital Network (ISDN) circuit switch capable system that combines voice and Voice Over Internet Protocol telecommunications, multiplexing, transmission encryption, and group modem capabilities in one system for command, control, administrative, and logistic voice communications. Facilitates secure and non-secure voice, circuit switching functions, and network routing and management functions with current fielded tactical systems of the military services. Interoperates with joint, coalition, and host nation networks, and operates in unclassified and classified environments. Beginning in FY19 TVSS is transitioning to an all software solution with no Hardware requirements.

(U) Combat Data Network (CDN), formerly Data Distribution System - Modular (DDS-M): The CDN provides the commander a modular, integrated, and interoperable Internet Protocol (IP)- based LAN and WAN data networking capability that forms the data communications backbone and data communications support to organizations within a MAGTF. The CDN provides extension of the Defense Information System Network (DISN), Secret Internet Protocol Router Network (SIPRNet), Sensitive But Unclassified (SBU), Non-secure Internet Protocol Router Network (NIPRNet) as well as a Coalition networking capability and access to strategic, supporting establishments, joint and other service component tactical data networks for Marine Corps Tactical Data Systems (TDSs) and other CDN. The CDN provides Marine Corps maneuver elements with a modular and scalable IP data transport capability that will replace, supplement and be used with existing legacy data systems through the integration of computers, routers, data switches and cabling, radio net interface units, modems, link encryption devices, and patch panels. Uninterrupted Power Supplies (UPS) provide for emergency power and continuity of operations. The CDN can operate from the SBU up to the Top Secret/Sensitive Compartmented Information (TS/SCI) level and contains integral In-line Network Encryption (INE) device supporting IP Security (IPSec) and Virtual Private Networking (VPN).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: NPM: Product Development	0.785	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2276 / *Comms Switching and Control Sys*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Program transitions to sustainment beginning in FY19. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** N/A					
Title: TVSS: Management Services ***Articles:*** ***Description:*** TVSS is transitioning to a virtual software solution with no hardware requirements. ***FY 2019 Plans:*** Continue system accreditation with annual cyber security testing. ***FY 2020 Base Plans:*** Continue development requirements and annual cyber security testing in support of transition from hardware to software solution. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.003 from FY19 to FY20 reflect program requirements transition to Tactical Networking portfolio.	0.001 -	0.068 -	0.065 -	0.000 -	0.065 -
Title: CDN: Product Development ***Articles:*** ***Description:*** CDN Product Development: Funds support Engineering Change Proposals (ECP) for systems tech refresh on a three to five year cycle while in sustainment. ***FY 2019 Plans:***	0.530 -	0.550 -	0.580 -	0.000 -	0.580 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue development and implementation of required hardware upgrades including Small Form Factor. ***FY 2020 Base Plans:*** Continue development of required hardware upgrades to include routers and servers. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.030M from FY19 to FY20 reflects annual cost increase.					
Title: CDN: Test and Evaluation	0.400	0.432	0.450	0.000	0.450
Articles:	-	-	-	-	-
Description: CDN Test and Evaluation: Funds support acquisition testing for system technology refresh on a three to five year cycle while in sustainment. ***FY 2019 Plans:*** Continue support for joint interoperability test certification efforts demonstrated through DoD Interoperability Communication Exercises for Small Form Factor upgrade. ***FY 2020 Base Plans:*** Continue support for joint interoperability test certification efforts demonstrated through DoD Interoperability Communication Exercises for routers and servers equipment upgrades. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.18 from FY19 to FY20 reflects the transition to upgraded system routers.					
Title: CDN: Management Services	0.352	0.625	0.683	0.000	0.683
Articles:	-	-	-	-	-
Description: CDN Management Services: Funds support Federally Funded Research and Development Contracts for systems tech refresh on a three to five year cycle while in sustainment. ***FY 2019 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue FFRDC efforts in support of Network Optimization and reconfiguration efforts to reduce size, weight, and power (SWaP) requirements for CDN systems. ***FY 2020 Base Plans:*** Continue FFRDC efforts in support of Network Optimization and reconfiguration efforts to upgrade system routers and servers. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $0.058M is attributed to the addition of testing and evaluation of the small form factor equipment.					
Accomplishments/Planned Programs Subtotals	2.068	1.675	1.778	0.000	1.778

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4634: *CDN*	37.128	35.844	29.944	-	29.944	35.757	36.355	37.128	37.870	Continuing	Continuing

Remarks

D. Acquisition Strategy

(U) Network Planning and Management (NPM): NPM will maximized use of existing Commercial Off-The-Shelf (COTS) and Government Off-The-Shelf (GOTS) products. NPM will continue to be upgraded as technology advances. Major focus will be on the incorporation of additional capabilities and functionality into the SPEED software to meet user requirements. R&D effort will focused on the development, integration, and testing of improved versions of existing capabilities. Program transitions to sustainment in FY19.

(U) Tactical Voice Switching System (TVSS) (formerly Transition Switch Module (TSM)): TVSS will maximize use of existing COTS, GOTS, and Government-Furnished Equipment (GFE). Major focus will be on maintaining cyber accreditation and interoperability with existing systems in the Marine Corps. R&D effort will focus on integration and testing of cyber vulnerability fixes of existing components.

(U) Combat Data Network (CDN), formerly Data Distribution System - Modular (DDS-M): CDN will maximize use of existing COTS, GOTS, and GFE. CDN hardware and software will continue to be upgraded and improved as technology advances. Major focus will be on interoperability and compatibility with existing systems and components in the Marine Corps, as well as Joint and Coalition forces. R&D effort will focus on integration and testing of improved versions of existing components. CDN may reuse other Services' development and utilize external contracts that satisfy requirements and analysis of alternatives.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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E. Performance Metrics

Milestone reviews and technical reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2276 / *Comms Switching and Control Sys*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NPM (SPEED S/W Development)	WR	NSWC : Crane, IN	0.969	0.165	Nov 2017	0.000		0.000		-		0.000	0.000	1.134	-
NPM (SPEED S/W Development)	C/CPFF	NSWC2 : Crane, IN	0.230	0.620	Jun 2018	0.000		0.000		-		0.000	0.000	0.850	-
CDN Development Efforts	WR	SSC PAC : Philadelphia, PA	0.000	0.530	May 2018	0.550	May 2019	0.580	May 2020	-		0.580	0.000	1.660	-
Prior Year Cumulative Funding	Various	Various : Various	28.606	0.000		0.000		0.000		-		0.000	0.000	28.606	-
		Subtotal	29.805	1.315		0.550		0.580		-		0.580	0.000	32.250	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Cumulative Funding	Various	Various : Various	5.696	0.000		0.000		0.000		-		0.000	0.000	5.696	-
		Subtotal	5.696	0.000		0.000		0.000		-		0.000	0.000	5.696	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CDN Testing	WR	SSC PAC : San Diego, CA	0.981	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
CDN Integration testing	WR	JITC : Ft. Huachuca, AZ	0.078	0.000		0.093	Jan 2019	0.090	Jan 2020	-		0.090	Continuing	Continuing	Continuing
CDN Testing	C/FFP	MCTSSA : San Diego, CA	0.000	0.290	May 2018	0.000		0.000		-		0.000	0.000	0.290	-
CDN Testing	C/FFP	MCSC Albany : Albany, GA	0.000	0.110	Jun 2018	0.000		0.000		-		0.000	0.000	0.110	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CDN Testing	C/FFP	NAWC-AD : Patuxent River, MD	0.000	0.000		0.339	Mar 2019	0.360	Mar 2020	-		0.360	0.000	0.699	-
Prior Year Cumulative Funding	Various	Various : Various	1.569	0.000		0.000		0.000		-		0.000	0.000	1.569	-
		Subtotal	2.628	0.400		0.432		0.450		-		0.450	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TVSS	FFRDC	MITRE : Stafford, VA	1.081	0.001	Nov 2017	0.068	Dec 2018	0.065	Dec 2019	-		0.065	0.000	1.215	-
CDN	FFRDC	MITRE : Stafford, VA	0.837	0.352	Nov 2017	0.625	Dec 2018	0.683	Dec 2019	-		0.683	0.000	2.497	-
Prior Year Cummulative Funding	FFRDC	MITRE : Stafford, VA	4.447	0.000		0.000		0.000		-		0.000	0.000	4.447	-
		Subtotal	6.365	0.353		0.693		0.748		-		0.748	0.000	8.159	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	44.494	2.068		1.675		1.778		-		1.778	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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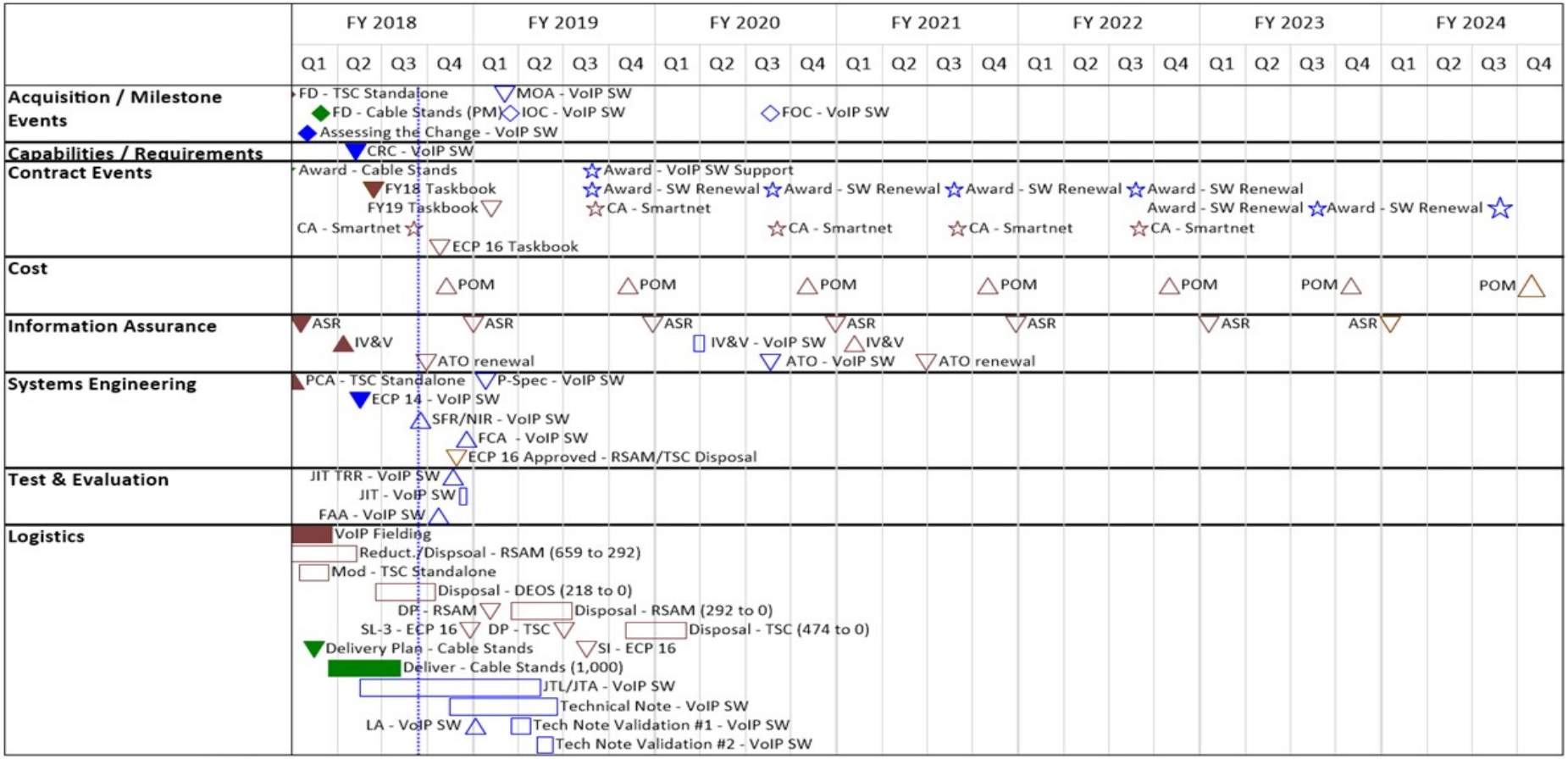
TVSS Program Schedule



Wired in the defense IMS 20180608.mpp; TVSS FoS IMS 20180613.mpp

Snapshot Date: 6/13/2018

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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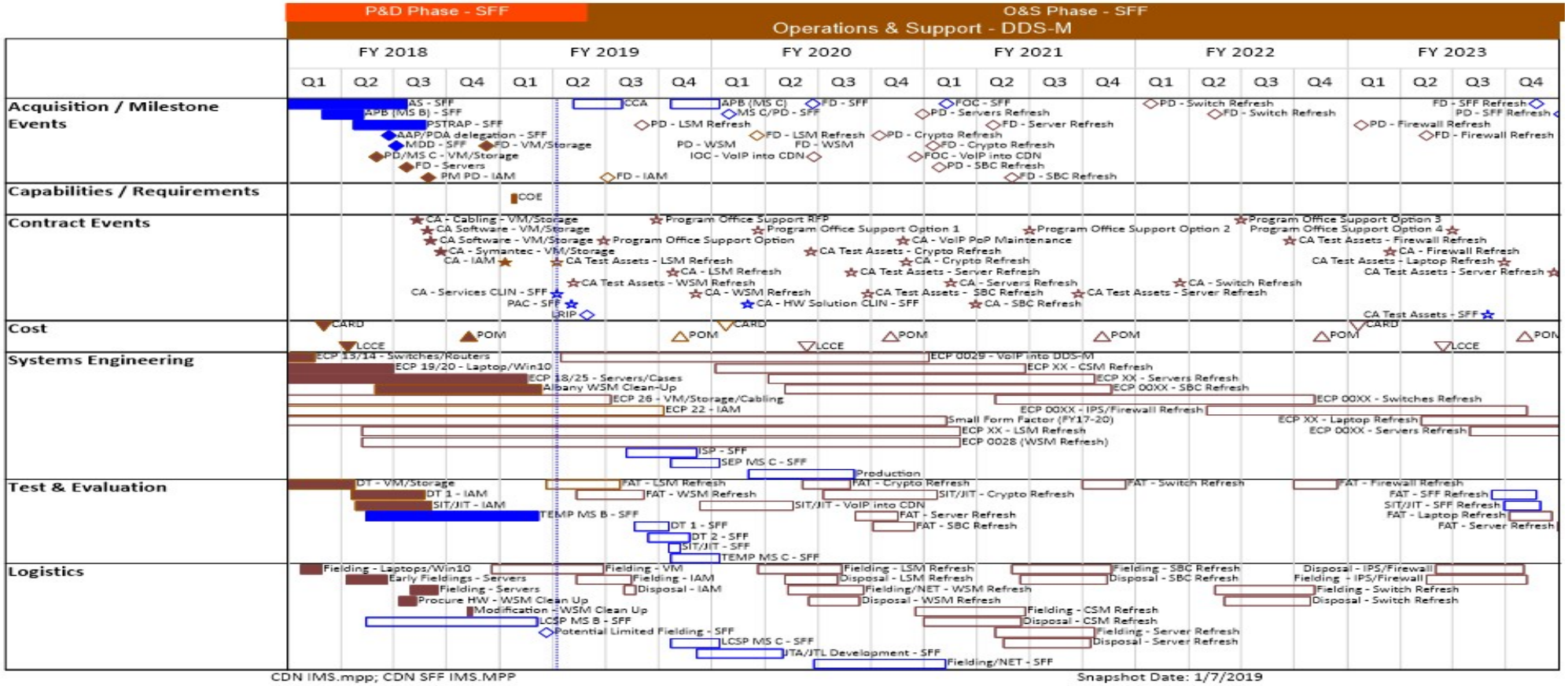

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2276				
CDN ECP VMware	1	2018	2	2019
CDN ECP IAM Server	1	2018	4	2019
CDN ECP SFF	1	2018	3	2019
CDN ECP LSM & WSM Routers	3	2018	1	2021
CDN FD VMware	4	2018	4	2018
CDN LRIP Award Small Form Factor (SFF)	4	2018	4	2018
CDN Fielding VMware	1	2019	2	2019
CDN MS-C SFF	2	2019	2	2019
CDN APB MS-C	2	2019	2	2019
CDN Test & Evaluation SFF	2	2019	3	2019
CDN Limited Fielding SFF	4	2019	4	2019
CDN Fielding Decision SFF	4	2019	4	2019
CDN Production Decision LSM & WSM Routers	4	2019	4	2019
TVSS MOA for VoIP Software	1	2019	1	2019
TVSS IOC VoIP Software	1	2019	1	2019
TVSS Contract Award VoIP Software	3	2019	3	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2277: *System Engineering and Integration*	48.106	6.732	4.263	5.071	-	5.071	5.530	5.429	5.133	5.235	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, Marine Civil Information Management System (MARCIMS), Public Affairs System (PAS) and Military Information Support Operations (MISO) funding has been realigned to project 3772, Information Related Capabilities. Realignment of efforts to new projects in FY19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

This project provides funds for engineering, test, and evaluation activity, which ensures that the systems being developed within the Program Element (PE) employ consistent standards for interoperability and to the maximum extent feasible use of hardware and software which is uniform and standard across programs.

Expeditionary Energy Office (E2O): Energy is a top priority for the USMC and one of the six pillars of Modernization for the Corps identified by the Commandant. In 2009, the Commandant established the USMC Expeditionary Energy Office (E2O), with the mission to analyze, develop, and direct the Marine Corps' energy strategy in order to optimize expeditionary capabilities across all warfighting functions. E2O's role is to advise the Marine Requirements Oversight Council (MROC) on all energy and resource related requirements, acquisitions, and programmatic decisions. This office and funding directly support execution of the USMC Expeditionary Energy Strategy and Implementation Plan (Mar 2011), and priorities identified in the USMC Expeditionary Energy Water and Waste Initial Capabilities Document/Capabilities Based Assessment (Sep 2011), as well as Science and Technology Objectives identified in the 2012 USMC S&T Strategic Plan. The Marine Corps program aligns with the Commandant's Planning Guidance 2010, the National Defense Authorization Act 2009, DoD directives and SECNAV goals. This funding will support the achievement of the Strategy, and the activities of the USMC Expeditionary Energy Concepts process, managed by the E2O.

Joint Interoperability of Tactical Command and Control Systems (JINTACCS) is a Joint Chiefs-of-Staff (JCS)/DoD-mandated program for joint development, implementation, and testing of tactical data links and US Message Text Format (MTF) under the direction of the Defense Information Systems Agency (DISA) and Office of the Secretary of Defense/ Networks and Information Integration (OASD/NII) per the Commander Joint Chiefs of Staff (CJCSI) Instructions 6610.01C and CJCS16241.04 respectively. This effort also covers interoperability and testing of tactical message standards such as MILSTD 6017 Variable Message Format used between the US Army and USMC; and Coalition message formats the Joint Command, Control, Consultation Information Exchange Data Model (JC3IEDM). Responsible for the development of Net Centric standards (XML, Web Services) to meet requirements of USMC/DoD/Coalition Net Centric Data Strategies. Efforts in this area include NATO Coalition interoperability initiatives, Army/Marine Corps Board support, and interoperability testing and certification to include cross domain.

Systems Engineering, Integration and Coordination (SEIC) is MCSC Chief Engineer's systems engineering and integration program. SEIC provides the decision support tools and engineering analysis resources needed to assess, identify and resolve Marine Air Ground Task Force (MAGTF)inter-systems' SoS issues and challenges. SEIC supports DC CD&I, DC PP&O, DC A, DC I&L, DC M&RA, HQMC C4, and HQMC INT in the analysis, evaluation, and assessment of MAGTF Systems and

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SoS requirements. SEIC centralized management of C4ISR programs allows the implementation of systems engineering certification process in support of milestone decision approval; a requirements and functional analysis process enabling system of systems engineering and an overarching C4ISR systems architecture, and a product realization process to support budget decisions. SEIC engineering conducts functional analyses for emergent system of systems challenges and ensures seamless integration and maximum interoperability of materiel across USMC, Naval, Joint, and DoD programs consistent with the Commandant's Vision and Strategy 2025.

The overall increase of $0.808M is primarily due to a $0.341M increase in field experimentation with Marine Corps Warfighting Lab for the E20 and a $0.435M increase to support pre-embarkation integration testing and reference and automation tools for deploying MEUs to support execution at the directed levels of efficiency.

Marine Civil Information Management System (MARCIMS) is a system of systems comprised of people, process and technology that operates in the full Joint, Interagency, Intergovernmental, and Multinational (JIIM) environment. It is a force multiplier for the commander that allows him to leverage the process of Planning, Collection, Consolidation, Analysis, Production, and sharing of civil information in order to support the visualization and understanding of the civil environment to the military commander's decision making process. This program transitions from C2277 to C3772 in FY19.

Public Affairs System (PAS) provides the Marine Air Ground Task Force (MAGTF) and the broader Marine Corps the capability to research, understand and affect the information environment. PA Marines and Systems enable commanders at all levels and across the range of military operations to engage domestic and foreign publics whose trust, confidence, and understanding are mission critical. The Public Affairs Systems (PAS) AAP identifies and fields materiel solutions required to research and plan communication initiatives, acquire still and video visual information, produce and disseminate communication products, and assess the effects of communication initiatives within the information environment. The program maintains an evolutionary approach to acquisitions, and leverages commercial industry-standard non-developmental items to provide the best value to the Marine Corps, while keeping PA Marines appropriately equipped to understand and affect the information environment. This effort supports research and evaluate solutions to modernize the Public Affairs Still Acquisition System into a single handheld device with the capability to acquire, edit and transmit still and video imagery and engage publics via traditional and social media. This program transitions from C2277 to C3772 in FY19.

The Military Information Support Operations (MISO)Family of Systems (FOS), which consists of the Fly-Away Broadcast System (FABS), Next-Generation Loud Speaker (NGLS), Radio-In-A-Box (RIAB), and Marine Corps SOF Integration Node (MISN), provides the Marine Air Ground Task Force (MAGTF) Commander the capability to conduct planned operations to convey selected information and indicators to foreign adversary, neutral and friendly target audiences to influence their emotions, motives, objective reasoning, providing an operational advantage. The MISO was established in response to multiple Marine Requirements Oversight Council Memorandums, and the approval of a MISO Organizational and Operational (O&O) Concept, 16 June 2015. MISO capabilities are critical to the success of the MAGTF mission, enabling commanders to shape the information environment, counter enemy propaganda, misinformation, disinformation, and adversarial narratives. The Signature Management (SIGMAN) capability will support MAGTF Operations with a baseline capability to include Own-force signature monitoring and assessment, Electromagnetic signature masking and projection, and physical decoys. This program transitions from C2277 to C3772 in FY19.

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Expeditionary Energy Office (E2O)	2.177	2.160	2.501	0.000	2.501
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to support the USMC Expeditionary Energy Strategy and Implementation Plan, and priorities identified in the USMC Expeditionary Energy Water and Waste Initial Capabilities Document/Capabilities Based Assessment, as well as Science and Technology Objectives identified in the 2012 USMC S&T Strategic Plan. Using these priority roadmaps, E2O will invest in R&D programs to advance Strategy goals. Priority areas for investment include, but are not limited to: Fuel distribution, Energy harvesting; hybrid power; efficient heating and cooling of people, equipment and water; energy storage; energy efficient vehicles; energy metering and monitoring and decision tools.					
FY 2020 Base Plans: - Begin field exercise experimentation with Marine Corps Warfighting Lab and its MAGTF Integration Exercise. Also, continue efforts to support the USMC Expeditionary Energy Strategy and Implementation Plan, and priorities identified in the USMC Expeditionary Energy Water and Waste Initial Capabilities Document/ Capabilities Based Assessment, as well as Science and Technology Objectives identified in the 2012 USMC S&T Strategic Plan. Using these priority roadmaps, E2O will invest in R&D programs to advance Strategy goals. Priority areas for investment include, but are not limited to: Fuel distribution, Energy harvesting, hybrid power, energy command and control data, energy storage, energy metering and monitoring decision tools.					
FY 2020 OCO Plans: No OCO funds					
FY 2019 to FY 2020 Increase/Decrease Statement: The $.341M increase is due to the planned and culminating field experimentation with Marine Corps Warfighting Lab and its MAGTF Integration Exercise.					
Title: JINTACCS: JCS and DoD CIO Data Links Testing	0.555	0.547	0.579	0.000	0.579
Articles:	-	-	-	-	-
Description: Joint Interoperability of Tactical Command and Control Systems (JINTACCS) is a United States military program for the development and maintenance of tactical information exchange configuration items (CIs) and operational procedures. It was originated to ensure that the command and control (C2 and C3) and weapons systems of all US military services and NATO forces would be interoperable. MARCORSYSCOM Systems Engineering, Interoperability Architectures, and Technology direct the JINTACCS Program. Created					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
as a non-acquisition R&D engineering program it provides for critical engineering services in several areas. JINTACCS is essential to USMC development and maintenance of tactical data exchange standards (Link 16, VMF, MTF, etc.), maintenance of C2 systems interoperability issues, development of Net Centric standards (XML, Web Services) to meet requirements of DoD/USMC Net Centric Data Strategy, and participation in Marine Corps, Joint, and Coalition Interoperability Certification testing to DoD/JCS/USMC/ NATO requirements in an ever-changing cyber environment. Requirements annotated in IT Budget Submit (NC-36). Increased involvement with the Army Marine Corps Board (AMCB, 3 Star Charter)), NATO Coalition Interoperability Assurance and Validation (CIAV) and Cross Domain Solution (CDS) certification. ***FY 2019 Plans:*** - Continue to provide Marine Corps representation at TDL and tactical data message working groups, CCBs, and other interoperability forums. Continue to assess and represent Marine Corps positions on TDL and tactical data message ICPs, RFEs, and other initiatives. - Continue data collection and information dissemination associated with the Marine Corps IEP. Enter system bit-level information into the eSMART tool; conduct interoperability assessments of MAGTF systems using the eSMART tool to highlight gaps and identify investment opportunities to meet emerging interoperability needs; provide feedback to JCS representatives concerning shortfalls or recommended improvements to the eSMART tool. - Continue to provide TDL and tactical data link subject matter expert support to Marine Corps Systems Command and Program Executive Office Land Systems programs to support test, certification, and modernization of Marine Corps capabilities. ***FY 2020 Base Plans:*** - Continue to provide Marine Corps representation at TDL and tactical data message working groups, CCBs, and other interoperability forums. Continue to assess and represent Marine Corps positions on TDL and tactical data message ICPs, RFEs, and other initiatives. - Continue data collection and information dissemination associated with the Marine Corps IEP. Enter system bit-level information into the eSMART tool; conduct interoperability assessments of MAGTF systems using the eSMART tool to highlight gaps and identify investment opportunities to meet emerging interoperability needs;					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2277 / *System Engineering and Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
provide feedback to JCS representatives concerning shortfalls or recommended improvements to the eSMART tool. - Continue to provide TDL and tactical data link subject matter expert support to Marine Corps Systems Command and Program Executive Office Land Systems programs to support test, certification, and modernization of Marine Corps capabilities. ***FY 2020 OCO Plans:*** No OCO funds ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.					
Title: SEIC: Engineering and Technical Support	1.958	1.556	1.991	0.000	1.991
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiate technical and engineering support to the development of the 2019 Afloat MAGTF C4 Required Capabilities (AMC4RC) Letter. - Continue to contribute to the OPNAV N9 & N2/N6 Blue-In-Support-Of-Green (BISOG) program development. - Continue engineering support to the development of USMC input to OUSD AT&L's Joint C2 Capability Area FY19/20 Integration Workshop - Continue integration MAGTF C2 systems and C4 services with shipboard C2 architectures and C4ISR infrastructures in direct support of MEU deployments via DGSIT - Conduct focused integration testing with PEO C4I & SPAWAR to integrate MCEN Services and MAGTF C4I Systems into the Navy's follow-on version of Consolidated Afloat Network Enterprise Services (CANES) environment aboard the LHD, LHA-6, LPD and LSD class amphibious assault ships - Continue to baseline and assess options to address gaps within the Information Exchange Capabilities of the MAGTF. - Continue to manage and expand the Engineering Knowledge Management system to provide consumer focused support to the engineering competency in a configuration controlled electronic library system. ***FY 2020 Base Plans:*** - Continue technical and engineering support to the development of the 2019 Afloat MAGTF C4 Required Capabilities (AMC4RC) Letter - Continue to contribute to the OPNAV N9 & N2/N6 Blue-In-Support-Of-Green (BISOG) program development					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** *2277 / System Engineering and Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue engineering support to the development of USMC input to OUSD AT&L's Joint C2 Capability Area FY19/20 Integration Workshop - Continue focused integration testing with PEO C4I & SPAWAR to integrate MCEN Services and MAGTF C4I Systems into the Navy's follow-on version of Consolidated Afloat Network Enterprise Services (CANES) environment aboard the LHD, LHA-6, LPD and LSD class amphibious assault ships - Continue to manage and expand the Engineering Knowledge Management system to provide consumer focused support to the engineering competency in a configuration controlled electronic library system - Continue integration MAGTF C2 systems and C4 services with shipboard C2 architectures and C4ISR infrastructures in direct support of MEU deployments via Deploying Group Systems Integration Test (DGSIT) ***FY 2020 OCO Plans:*** No OCO funds ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $.435M increase supports the continuation of pre-embarkation DGSITs, SOTs/SOVTs for deploying MEUs and to provide required engineering reference and automation tools necessary to perform their functions at the directed level of efficiency.					
Title: Public Affairs System (PAS): Product Development ***Articles:*** ***FY 2019 Plans:*** - Program transitions to C3772 ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	0.090 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: MARCIMS: Marine Civil Information Management System Support ***Articles:*** ***FY 2019 Plans:*** -Program transitions to C3772 ***FY 2020 Base Plans:***	0.409 -	0.000 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2277 / *System Engineering and Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2020 OCO Plans:*** N/A					
Title: Military Information Support Operations (MISO): Product Development ***Articles:*** ***Description:*** The MISO Family of Systems (FOS), which consists of the Fly-Away Broadcast System (FABS), Next-Generation Loud Speaker (NGLS), Radio-In-A-Box (RIAB), and Marine Corps SOF Integration Node (MISN), provides the Marine Air Ground Task Force (MAGTF) Commander the capability to conduct planned operations to convey selected information and indicators to foreign adversary, neutral and friendly target audiences to influence their emotions, motives, objective reasoning, providing an operational advantage. Funds transition to Project C3772 in FY19. ***FY 2019 Plans:*** - Program transitions to C3772 ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	1.543 -	0.000 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	6.732	4.263	5.071	0.000	5.071

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4620a: *MARCIMS*	0.000	0.296	0.000	-	0.000	0.302	0.000	0.308	0.314	Continuing	Continuing
• PMC/4620b: *Public Affairs Systems*	3.482	0.917	0.691	-	0.691	0.710	0.722	0.736	0.751	Continuing	Continuing
• PMC/4620c//: *MISO*	0.000	2.976	8.364	-	8.364	9.924	9.938	7.853	8.010	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2277 / *System Engineering and Integration*

D. Acquisition Strategy

The System Engineering and Integration programs utilizes a non-traditional acquisition strategy. The program utilize the Naval Surface Warfare Centers for system engineering support services.

EEO - Expeditionary Energy Strategy and Implementation Plan, and priorities identified in the USMC Expeditionary Energy Water and Waste Initial Capabilities Document/Capabilities Based Assessment, as well as Science and Technology Objectives identified in the 2012 USMC S&T Strategic Plan. The program utilize the Naval Surface Warfare Centers for system engineering support services.

JINTACCS - Created as a non-acquisition R&D engineering program it provides for critical engineering services in several areas. (JINTACCS) is a United States military program for the development and maintenance of tactical information exchange configuration items (CIs) and operational procedures. It was originated to ensure that the command and control (C2 and C3) and weapons systems of all US military services and NATO forces would be interoperable. MARCORSYSCOM Systems Engineering, Interoperability Architectures, and Technology direct the JINTACCS Program. The program utilize the Naval Surface Warfare Centers for system engineering support services.

SEIC - Provides the decision support tools and engineering analysis resources needed to assess, identify and resolve Marine Air Ground Task Force (MAGTF)inter-systems' SoS issues and challenges. SEIC supports the Marine Corps in the analysis, evaluation, and assessment of MAGTF Systems and SoS requirements. The program utilize the Naval Surface Warfare Centers for system engineering support services.

E. Performance Metrics

Technical and program reviews.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2277 / *System Engineering and Integration*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	8.980	0.000		0.000		0.000		-		0.000	0.000	8.980	-
PAS	WR	SSC - PAC : San Diego, CA	0.286	0.090	Mar 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MISO	FFRDC	Johns Hopkins University : Laurel, MD	0.000	0.943	Aug 2018	0.000		0.000		-		0.000	0.000	0.943	-
MISO	C/FFP	MCSC : Quantico, VA	0.000	0.600	Apr 2018	0.000		0.000		-		0.000	0.000	0.600	-
		Subtotal	9.266	1.633		0.000		0.000		-		0.000	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative	Various	Not Specified : Not Specified	18.443	0.000		0.000		0.000		-		0.000	0.000	18.443	-
MARCIMS	WR	NSWC : Indian Head, MD	0.217	0.409	Feb 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MAGTF SEI&C	C/FFP	Various : Various	0.227	0.244	Nov 2017	0.000		0.000		-		0.000	0.000	0.471	-
MAGTF SEI&C	C/FFP	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
MAGTF SEI&C	C/BA	NSWC Crane : Bloomington, IN	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
MAGTF SEI&C	C/BA	USA CECOM - MITRE : Aberdeen, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
MAGTF SEI&C	C/BA	Naval Research Lab : Washington, DC	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
MAGTF SEI&C	WR	NSWC : Dahlgren, VA	5.203	0.280	Nov 2017	0.230	Nov 2018	0.250	Nov 2019	-		0.250	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) *2277 / System Engineering and Integration*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MAGTF SEI&C	C/FFP	DTIC : FT. Belvoir	0.529	0.522	Apr 2018	0.000		0.000		-		0.000	0.000	1.051	-
MAGTF SEI&C	MIPR	HHS : Bethesda, MD	0.597	0.712	Nov 2017	0.000		0.000		-		0.000	0.000	1.309	-
MAGTF SEI&C	C/FFP	SIMVENTIONS : Stafford, VA	0.126	0.065	Nov 2017	0.000		0.000		-		0.000	0.000	0.191	-
MAGTF SEI&C	WR	NSWC : DAM NECK, VA	0.135	0.135	Nov 2017	0.000		0.150	Dec 2019	-		0.150	0.000	0.420	-
MAGTF SEI&C	C/FP	MANTECH : Stafford, VA	0.000	0.000		1.326	Nov 2018	1.591	Mar 2020	-		1.591	0.000	2.917	-
JINTACCS	C/FFP	MCTSSA : Camp Pendleton, CA	1.631	0.400	Jan 2018	0.272	Jan 2019	0.300	Mar 2020	-		0.300	0.000	2.603	-
JINTACCS	C/FFP	IEP Analysis : Quantico, VA	0.000	0.000	Jan 2018	0.225	Jan 2019	0.225	Jan 2020	-		0.225	0.000	0.450	-
Experimental Forward Operating Base (E2O)	WR	SSC PAC : San Diego, CA	1.812	0.750	Nov 2017	0.350	Nov 2018	0.612	Jan 2020	-		0.612	0.000	3.524	-
Experimental Forward Operating Base (E2O)	WR	Various : Various	0.660	0.732	Nov 2017	0.802	Nov 2018	0.558	Nov 2019	-		0.558	0.000	2.752	-
Experimental Forward Operating Base (E2O)	WR	NSWC : Carderock	0.378	0.250	Nov 2017	0.150	Nov 2018	0.403	Nov 2019	-		0.403	0.000	1.181	-
Experimental Forward Operating Base (E2O)	WR	NAVFAC EXWC : Port Hueneme, CA	0.420	0.120	Nov 2017	0.608	Nov 2018	0.119	Feb 2020	-		0.119	0.000	1.267	-
Experimental Forward Operating Base (E2O)	WR	NSWC : Panama City, FL	0.200	0.000		0.075	Nov 2018	0.334	Nov 2019	-		0.334	0.000	0.609	-
Experimental Forward Operating Base (E2O)	WR	NSWC : Crane, IN	0.451	0.300	Nov 2017	0.150	Nov 2018	0.000		-		0.000	0.000	0.901	-
Experimental Forward Operating Base (E2O)	C/FFP	DTIC : FT. Belvoir	0.025	0.025	Nov 2017	0.025	Nov 2018	0.075	Apr 2020	-		0.075	0.000	0.150	-
Experimental Forward Operating Base (E2O)	WR	NSWC Dahlgreen : Dahlgren, VA	0.000	0.000		0.000		0.400	Mar 2020	-		0.400	0.000	0.400	-
		Subtotal	31.054	4.944		4.213		5.017		-		5.017	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative	Various	Various : Various	7.611	0.000		0.000		0.000		-		0.000	0.000	7.611	-
		Subtotal	7.611	0.000		0.000		0.000		-		0.000	0.000	7.611	N/A

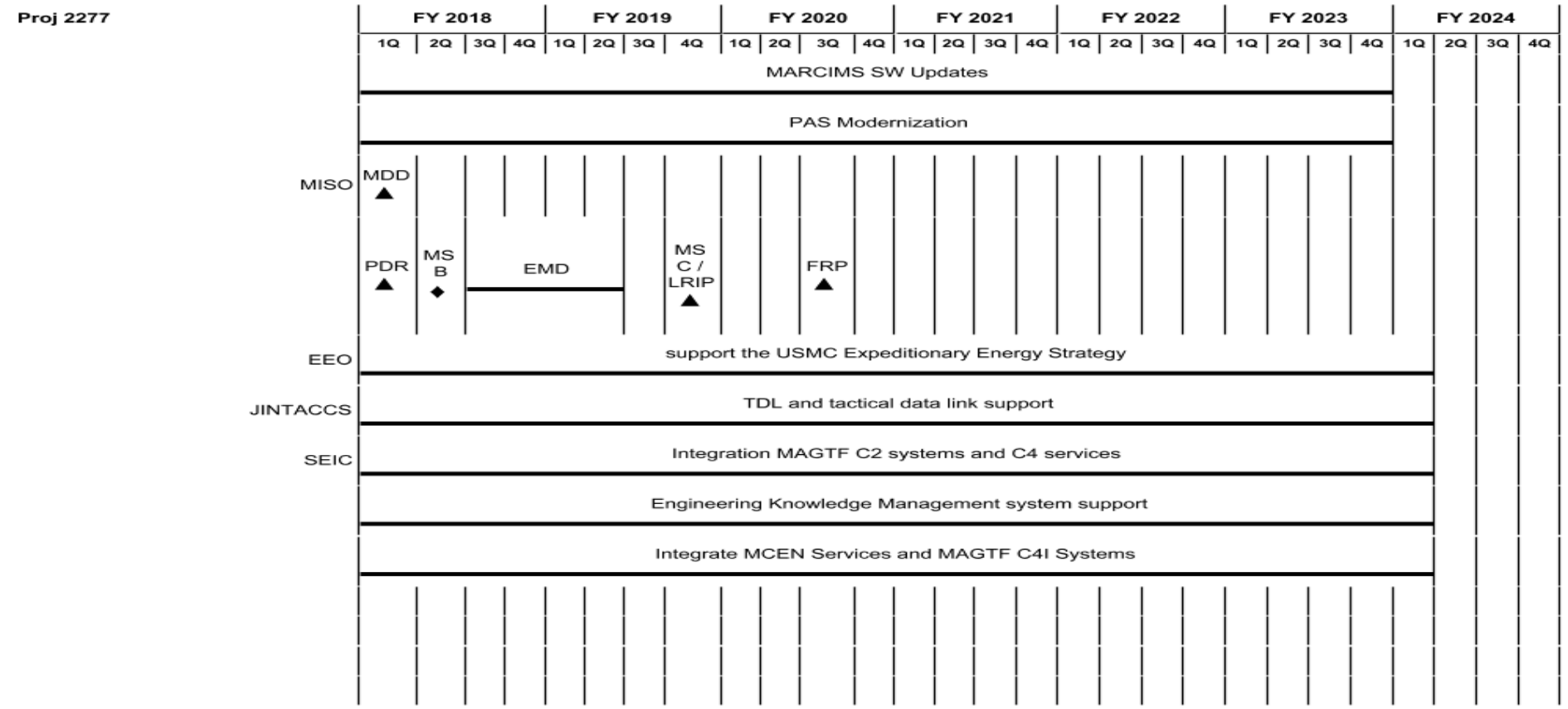
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JINTACCS-Travel	Various	PROGRAM : TRAVEL	0.175	0.155	Feb 2018	0.050	Feb 2019	0.054	Feb 2020	-		0.054	Continuing	Continuing	Continuing
		Subtotal	0.175	0.155		0.050		0.054		-		0.054	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	48.106	6.732		4.263		5.071		-		5.071	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2277 / *System Engineering and Integration*



2020OSD - 0206313M - 2277

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2277 / *System Engineering and Integration*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2277				
MARCIMS SW Updates	1	2018	4	2023
PAS Modernization	1	2018	4	2023
MISO: MDD	1	2018	1	2018
MISO: PDR	1	2018	1	2018
MISO: MS B	2	2018	2	2018
MISO: EMD	3	2018	2	2019
MISO: MS C / LRIP	4	2019	4	2019
MISO: FRP	3	2020	3	2020
EEO: support the USMC Expeditionary Energy Strategy	1	2018	1	2024
JINTACCS: TDL and tactical data link support	1	2018	1	2024
SEIC: integration MAGTF C2 systems and C4 services	1	2018	1	2024
SEIC: Engineering Knowledge Management system support	1	2018	1	2024
SEIC: integrate MCEN Services and MAGTF C4I Systems	1	2018	1	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2278 / *Air Defense Weapons System*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2278: *Air Defense Weapons System*	91.427	28.794	89.735	49.535	15.000	64.535	36.523	12.351	26.052	26.570	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

GBAD Future Weapons System (GBAD-FWS): Recognizing that organic GBAD capability was being over matched by Unmanned Aerial Systems (UAS) proliferation four GBAD capability gaps were identified. In response to these defense gaps, the concept of an evolutionary GBAD FWS was developed. The GBAD FWS capability is being developed in three increments. Increment 1 modernizes the existing GBAD legacy systems (AMANPADS) by mounting a mix of legacy and technologically mature capabilities (from UUNS achievements) onto Joint Light Tactical Vehicles (JLTV), mitigating the risk of attacks from UAS and FW/RW aircraft, while maintaining pace with maneuver forces. Increment 2 focuses on extended range enhancement to the Increment 1 system as well as kinetic and non kinetic capabilities. Increment 3 will be a new system designed to defend fixed/semi-fixed assets against Cruise Missiles (CM) and Rockets, Artillery and Mortar (RAM) threats. GBAD FWS Increment 1 is called Marine Air Defense Integrated System (MADIS Inc 1) which has been designated an ACAT II program. MADIS Inc 1 entered development mid-FY18 leveraging the UUNS efforts and culminate in a Milestone C 1QFY20. An IOC of 4QFY21 and FOC of 4QFY25 have been established via the Capability Development Document (CDD). Inc 3 will provide medium range intercept (MRI) capability. A demonstration is slated for 4QFY19, in an effort to deliver this mission critical capability more rapidly and address emerging threats from Peer, Near Peer Competitors. Inc 3 will be compatible and integrated with CAC2S and Ground/Air Task Oriented Radar (G/ATOR) and able to operate on Marine Corps and Joint Integrated Air Defense System networks.

Ground Based Air Defense-Stinger Sustainment (GBAD-SS) - Since 2008, the GBAD mission of Low Altitude Aerial Defense (LAAD) has been accomplished with the Advanced Man Portable Air Defense System (A-MANPADS). GBAD-SS transforms Air Defense equipment through technology insertion and equipment repackaging to address capability gaps as the result of equipment obsolescence and the emergent and evolving threats to the Marine Air Ground Task Force (MAGTF). GBAD-SS consists of the following efforts: 1) systems engineering support for Stinger Mounted Optic and Mode 5/S Identification Friend or Foe (IFF); 2) design, test, and integration of new systems to replace aging and obsolescent components until replaced by MADIS Inc 1, and to retain interfaces with, and be capable of receiving, a Common Aviation Command and Control System (CAC2S) broad casted link.

Overall, the Ground Based Air Defense Weapons System $25.200M decrease from FY19 to FY20, in combined baseline and OCO funding, reflects both GBAD FWS Increment 1, known as Marine Integrated Air Defense System (MADIS Inc 1) migration to production and deployment phase and the continued pursuit of advanced technology solutions to support critical emergent CENTCOM warfighting requirements identified in JUONS #CC-0558. FY20 funding will support the Early Operational Verification and New Equipment Training development to support MADIS Inc 1 as well as continued integration of a Medium Range Intercept (MRI) capability. MADIS Inc 1 has been designated an ACAT-II program with Milestone C planned for 1QFY20, IOC in 4QFY21 and FOC in 4QFY25.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: GBAD STINGER SUSTAINMENT: Product Development	1.420	1.840	0.026	0.000	0.026

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2278 / *Air Defense Weapons System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: -Initiated system design and engineering efforts associated with the Night Sight replacement. ***FY 2020 Base Plans:*** -Completes system design and engineering efforts associated with the Night Sight replacement. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease in funding from FY19 to FY20 of $1.814 reflects the ramp down of design and engineering efforts and transition into the production phase of the Night Sight replacement.					
Title: GBAD STINGER SUSTAINMENT: Support Costs	0.462	0.065	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: -Completed Analysis of Alternatives for the Night Sight replacement ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.065M from FY19 to FY20 due to completion of Night Sight AOA and subsequent procurement of systems					
Title: GBAD STINGER SUSTAINMENT: Test and Evaluation	0.737	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2020 OCO Plans:*** N/A					
Title: GBAD STINGER SUSTAINMENT: Program Management Support ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	0.664 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: GBAD FWS/COUNTER UAS Product Development ***Articles:*** ***FY 2019 Plans:*** -Completed GBAD Future Weapons System engineering and prototype development efforts to determine the technology solutions required to defeat the full spectrum of threats to include UAS's associated with the Marine Corps Low-Altitude Air Defense mission, specifically the Group 1 and 2 threats. Systems will provide capabilities such as detect, track, identify, threat defeat and lethal destruction, to include utilizing a slew-to-cue optic system for a high energy laser engagement. Funding will purchase drone on drone and other kinetic kill capabilities, C-UAS Component Integration Kits for the Mine Resistant Ambush Protected-All Terrain Vehicle (M-ATV) and a C-UAS C2 Network. -Initiated and completed GBAD FWS MADIS Inc 1 integration by mounting a mix of legacy and technologically mature capabilities (from UUNS achievements) onto Joint Light Tactical Vehicles (JLTV), mitigating the risk of attacks from UAS and FW/RW aircraft, while maintaining pace with maneuver forces. -Initiated C2/Sensor Software and fire control radar engineering development to integrate a medium range Interceptor missile system with the existing "Kill Chain" C2 architecture. This capability will be designed to be effective against rockets, Group 3+ Unmanned Aerial Systems, mortars, cruise missiles, precision guided missiles and rotary wing/fixed wing aircraft.	22.324 -	59.898 -	13.639 -	11.782 -	25.421 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2278 / *Air Defense Weapons System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Initiates development of MADIS desktop training systems ***FY 2020 Base Plans:*** -Continue C2/Sensor Software engineering development to integrate a medium range intercept (MRI) system with the existing "Kill Chain" C2 architecture. This capability will be designed to be effective against rockets, Group 3+ Unmanned Aerial Systems, mortars, cruise missiles, precision guided missiles and rotary wing/fixed wing aircraft. -Initiates development and integration efforts associated with increased lethality to support constantly evolving threats. -Continues development of MADIS desktop training systems ***FY 2020 OCO Plans:*** -$11.782M provides for the rapid prototyping of equipment by pursuing advanced technology solutions in order to support critical emergent CENTCOM warfighting requirements identified in JUONS #CC-0558. Funding supports development associated with Fire Control for drone on drone and other kinetic kill capabilities, integration of C-UAS capabilities into a C2 system for airspace deconfliction & data sharing across air and ground C2 nodes. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Overall, funding decreases $34.477M from FY19 to FY20, as GBAD Increment 1, also known as Marine Integrated Air Defense System (MADIS), effort migrates to production with Milestone C 1QFY20 with an IOC of 4QFY21 and FOC of 4QFY25. MADIS Inc 1 has been designated as an ACAT-II program.					
Title: GBAD FWS/COUNTER UAS: Support Costs	1.985	18.407	22.018	0.000	22.018
Articles:	-	-	-	-	-
Description: The Government Technical Support Team provides inherently governmental support functions adding depth, breath and expertise not resident in the GBAD Program Office. Functions include technical planning, execution and analysis across multi-disciplinary competencies to include; Systems Architecture, Radar/Jamming Software Engineering, Radar/Jamming Systems Engineering, Cyber Security/Information Assurance, Human Systems Integration, Safety, Configuration Management and the coordination necessary to enable a System of Systems interface with other programs in the "Cue to Slew" kill chain to ensure platform/					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2278 / *Air Defense Weapons System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
software compatibility. Technical Team support is vital in providing both studies and analysis during the Systems Development and Demonstration phase.					
FY 2019 Plans: -Continued GBAD Future Weapons System and Counter UAS acquisition, engineering, and assessment efforts to determine the technology solutions required to defeat UAS threats associated with the Marine Corps Low-Altitude Air Defense mission. Efforts focus on C-UAS prototype software load set analysis with updates to address the ever evolving enemy threat and engineering efforts with lessons learned from the procurement of initial CUAS prototypes from FY17-19. -Initiated New Equipment Training (NET) development support efforts for MADIS Inc 1. -Initiated technical manual development support for MADIS Inc 1. -Initiated onsite engineering support at military operations, military exercises, military schools, and technology demonstrations. -Initiated engineering and logistics support to ensure systems meet reliability thresholds					
FY 2020 Base Plans: -Completion of GBAD Future Weapons System JUON and JEON acquisition, engineering, and assessment efforts to determine the technology solutions required to defeat UAS threats associated with the Marine Corps Low-Altitude Air Defense mission. Efforts focus on C-UAS prototype software load set analysis with updates to address the ever evolving enemy threat and engineering efforts with lessons learned from the procurement of initial CUAS prototypes. -Continues New Equipment Training (NET) development support efforts for MADIS Inc 1. -Continues technical manual development support for MADIS Inc 1. -Continues onsite engineering support at military operations, military exercises, military schools, and technology demonstrations. -Initiates full logistics supportability to include Independent Logistics Assessment (ILA), provisioning conferences, updates of manpower and training plan and manpower task lists for MADIS Inc 1. -Continues engineering and logistics support to ensure systems meet reliability thresholds.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funding increases of $3.611M from FY19 to FY20 supports the ramp up of New Equipment Training and logistics supportability development efforts as well as onsite support efforts in order to ensure Warfighter safety and proficiency while operating the system.					
Title: GBAD FWS/COUNTER UAS: Test and Evaluation	0.000	8.721	13.033	3.218	16.251
Articles:	-	-	-	-	-
FY 2019 Plans: -Continued GBAD Future Weapons System Test and Evaluation of C-UAS Systems Soft-Kill and Hard-Kill prototypes integrated on both M-ATV's and JLTV's in support of JUON and JEON efforts. Testing locations include Yuma Proving Grounds AZ, NSWC Crane, NSWC Dahlgren and Quantico VA.					
FY 2020 Base Plans: -Completes GBAD Future Weapons System Test and Evaluation of C-UAS Systems Soft-Kill and Hard-Kill prototypes integrated on both M-ATV's and JLTV's in support of JUON and JEON efforts. -Initiates GBAD Future Weapons System Early Operational Verification (EOV) of MADIS Inc 1, leveraging the completed Test and Evaluation of the C-UAS systems. Testing locations include Yuma Proving Grounds AZ, Crane, IN, and White Sands Missile Range NM.					
FY 2020 OCO Plans: $3.218M provides for the test and evaluation of C-UAS "hard kill" capabilities to support urgent OCONUS needs identified in CENTCOM JUONS #CC-0558. Funding supports the Live Fire Test and Evaluation of the Fire Control for the drone on drone and other kinetic kill capabilities as well as the test and evaluations of the integration of C-UAS capabilities into a C2 system for airspace deconfliction & data sharing across air and ground C2 nodes and the mobile desktop trainer.					
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increase of $7.530M from FY19 to FY20 to support testing, assessment and evaluation to include EOV of MADIS Inc 1, C2 software testing and Weapon System Evaluation Safety Review Board (WSESRB) in support of MADIS Inc 1 and Inc 3 Medium Range Intercept (MRI).					
Title: GBAD FWS/COUNTER UAS: Program Management Support	1.202	0.804	0.819	0.000	0.819
Articles:	-	-	-	-	-
FY 2019 Plans: -Continued GBAD Future Weapons System acquisition documentation to include the initiation of the Fielding Plan, the Life Cycle Sustainment Plan and the Programmatic Environmental Safety and Occupational Health					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Evaluation (PESHE) which are all required documentation to support new technology solutions required to defeat the full spectrum or threats associated with the Marine Corps Low-Altitude Air Defense mission. ***FY 2020 Base Plans:*** -Continues development of GBAD Future Weapons System acquisition documentation for both MADIS Inc 1 and Inc 3 Medium Range Intercept (MRI). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The funding increase of $0.015M in FY20 funds acquisition documentation support for the new MADIS ACAT II program.					
Accomplishments/Planned Programs Subtotals	28.794	89.735	49.535	15.000	64.535

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/3006: *GBAD*	10.026	18.334	175.998	-	175.998	267.976	238.980	233.442	238.127	21.675	1,316.775
• RDTEN/0206313M/9999: *FOB Protection-Counter-UAS*	51.959	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	81.920

Remarks

D. Acquisition Strategy

GBAD Ground Based Air Defense- Future Weapons Systems (GBAD FWS)-The GBAD FWS capability will be developed in three increments. Increment 1 modernizes the existing GBAD legacy systems (A-MANPADS) by mounting a mix of legacy and technologically mature capabilities (from UUNS achievements) onto new tactical vehicles, Joint Light Tactical
Vehicles (JLTV), mitigating the risk of attacks from UAS and FW/RW aircraft, while maintaining pace with maneuver forces. Increment 2 focuses on extended range enhancement to the Increment 1 system along with the replacement of the Stinger missile. Increment 3 will be a new medium range intercept (MRI) capability designed to defend fixed/semi-fixed assets against Cruise Missiles (CM) and Rockets, Artillery, and Mortars (RAM) threats. GBAD FWS Increment 1 is called Marine Air Defense Integrated System (MADIS Inc 1), which has been designated an ACAT II program. MADIS Inc 1 will enter development phase mid FY18 and culminate in a Milestone C 1QFY20. Initial MADIS Inc 1 integration and development will be accomplished by Naval Surface Warfare Centers Crane and Dahlgren. An IOC of 4QFY21 and FOC of 4QFY25 have been established. To support a Material Support Decision, a concept demonstration of a proposed CM defense system has been planned for 4QFY19.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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Initial design and integration reviews for this CM system are underway at this time. A 4QFY19 Accelerated Acquisition decision from Deputy Assistant Secretary of the Navy (DASN) Expeditionary & Logistics Management (E&LM) is planned to place Inc 3 Medium Range Intercept under the Middle Tier Acquisition guidelines.

E. Performance Metrics

Integrated Master Schedule
OSD Financial Benchmarks
Technical Performance Measures
Probability of Program Success (PoPS) Assessments

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GBAD FWS MRI-SDD	MIPR	SCO : Arlington, VA	0.000	0.000		0.000		1.500	Jan 2020	-		1.500	0.000	1.500	-
GBAD FWS SDD	MIPR	ARL : Adelphi,MD	0.000	1.293	Oct 2018	1.575	Mar 2019	0.000		-		0.000	0.000	2.868	-
GBAD FWS SDD	Various	NSWC : Dahlgren, VA	0.000	1.098	Jul 2018	0.395	Nov 2018	2.101	Oct 2019	-		2.101	0.000	3.594	-
GBAD FWS SDD	MIPR	YPG : Yuma, AZ	0.000	0.915	Feb 2018	0.000		0.000		-		0.000	0.000	0.915	-
GBAD FWS SDD	MIPR	TSMO : Redstone Arsenal, AL	0.000	0.385	Nov 2017	0.000		0.000		-		0.000	0.000	0.385	-
GBAD FWS MRI-SDD	TBD	MCSC : Quantico, VA	0.000	0.000		0.000		4.500	Nov 2019	-		4.500	0.000	4.500	-
GBAD FWS MRI-SDD	C/FFP	Raytheon Solypsis : Fulton, MD	0.000	0.000		0.000		4.000	Nov 2019	-		4.000	0.000	4.000	-
GBAD-SS- SDD	WR	NSWC : Dahlgren, VA	0.807	0.356	Oct 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
GBAD-SS- SDD	WR	NSWC : Crane.IN	5.001	0.421	Nov 2017	1.840	Apr 2019	0.026	Dec 2019	-		0.026	Continuing	Continuing	Continuing
GBAD-SS-SDD	Various	VARIOUS : VARIOUS	7.360	0.643	Mar 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
GBAD FWS MRI-SDD	MIPR	DOTC : Picatinny, NJ	14.090	4.548	Feb 2018	0.645	Mar 2019	0.000		-		0.000	0.000	19.283	-
GBAD FWS GFE	MIPR	DLA : Philadelphia, PA	0.000	7.454	Mar 2018	37.079	Mar 2019	0.000		-		0.000	0.000	44.533	-
GBAD FWS SDD	Various	NSWC : Crane.IN	0.000	6.115	Sep 2018	6.631	Jul 2019	1.538	Dec 2019	-		1.538	0.000	14.284	-
GBAD FWS SDD	Various	Raytheon : Washington, DC	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
GBAD FWS SDD	Various	VARIOUS : VARIOUS	8.872	0.516	Sep 2018	0.136	Jul 2019	0.000		-		0.000	0.000	9.524	-
GBAD FWS OCO SDD	Various	PD CRAM : Redstone Arsenal, AL	0.000	0.000		0.000		0.000		11.782	Dec 2019	11.782	0.000	11.782	-
GBAD FWS OCO SDD	Various	NSWC : Crane.IN	0.000	0.000		13.437	Jul 2019	0.000		-		0.000	0.000	13.437	-
Prior Years Cumulative Funding	Various	N/A : N/A	30.197	0.000		0.000		0.000		-		0.000	0.000	30.197	-
		Subtotal	66.327	23.744		61.738		13.665		11.782		25.447	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Overall decrease of $36.291M from FY19 to FY20 is comprised of:
GBAD SDD decrease of $59.134M from FY19 to FY20 reflects drop in product development as MADIS Inc 1 begins production with the installation of multiple C-UAS components on the Joint Lightweight Tactical Vehicle (JLTV).
$11.782M OCO increase for PD CRAM provides for the development of C-UAS hard kill capabilities to support urgent OCONUS needs identified in CENTCOM JUONS #CC-0558.
$1.706M increase for GBAD FWS SDD to Dahlgren supports the ramp up associated with the development of the MADIS desktop training systems.
$9.355M increase for MRI SDD supports the Fire Control Radar Development and integration as well as the integration of an existing radar and command and control system in support of a Medium Range Intercept Capability

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GBAD FWS Eng Spt	C/FFP	MITRE : Herndon, VA	0.000	0.000		0.493	Sep 2019	0.805	Sep 2020	-		0.805	0.000	1.298	-
GBAD FWS NET Spt	TBD	MCSC : Quantico, VA	0.000	0.000		4.953	May 2019	6.240	May 2020	-		6.240	0.000	11.193	-
GBAD FWS Tech Spt	TBD	MCSC : Quantico, VA	0.000	0.000		0.307	Jan 2019	0.880	Jan 2020	-		0.880	0.000	1.187	-
GBAD-SS Eng Spt	WR	NSWC : Crane, IN	3.008	0.462	Jan 2018	0.065	May 2019	0.000		-		0.000	Continuing	Continuing	Continuing
GBAD FWS Eng Spt/HSI	Various	NSWC : Dahlgren	3.880	0.883	Dec 2017	5.858	Mar 2019	2.496	Dec 2019	-		2.496	0.000	13.117	-
GBAD FWS Eng Spt/NET/ FSR Spt	Various	NSWC : Crane, IN	0.000	0.758	Aug 2018	3.437	Jul 2019	9.959	Dec 2019	-		9.959	0.000	14.154	-
GBAD FWS C2 Spt	Various	PM CRAM : Redstone Arsenal, AL	0.000	0.000		0.750	Apr 2019	0.000		-		0.000	0.000	0.750	-
GBAD FWS Eng Spt/ILS	Various	VARIOUS : VARIOUS	0.000	0.344	Mar 2018	0.722	Jul 2019	1.638	Dec 2019	-		1.638	0.000	2.704	-
GBAD FWS OCO Eng Spt	WR	NSWC : Crane, IN	0.000	0.000		1.887	Feb 2019	0.000		-		0.000	0.000	1.887	-
Prior Years Cumulative Funding	Various	N/A : N/A	4.388	0.000		0.000		0.000		-		0.000	0.000	4.388	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	11.276	2.447		18.472		22.018		-		22.018	Continuing	Continuing	N/A

Remarks

Total increase of $3.546 from FY19 to FY20 supports the following:
$0.312M increase in GBAD FWS MITRE to support engineering efforts ensuring systems meet reliability thresholds.
$9.298M increase in GBAS FWS Tech Spt/NET/FSR/ILS supports the ramp up of New Equipment Training and technical manual development as well as logistics support ensuring systems meet reliability thresholds.
$3.362M decrease in GBAD FWS Eng Spt/HSI support at NSWC Dahlgren in Base and OCO supports the transition to NSWC Crane for NET development and onsite engineering efforts
$0.750M decrease in GBAD FWS C2 Spt at PD CRAM due to transition of efforts into production for MADIS Inc 1
$1.887M decrease in GBAD FWS OCO Eng Spt due to transition of efforts to NSWC Crane for NET development and onsite engineering efforts
$0.065M decrease in GBAD SS Eng Spt due to the completion of the design and engineering of the Night Sight replacement and transition into production

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GBAD FWS EOV	WR	NSWC Corona : Corona, CA	0.000	0.000		1.125	Nov 2018	1.688	Nov 2019	-		1.688	0.000	2.813	-
GBAD FWS Test Range	MIPR	White Sands Missile Range : White Sands, NM	0.000	0.000		2.000	Feb 2019	1.762	Feb 2020	-		1.762	0.000	3.762	-
GBAD FWS EOV	Various	NSWC Crane : Crane, IN	0.000	0.000		1.887	Mar 2019	4.019	Mar 2020	-		4.019	0.000	5.906	-
GBAD FWS OCO Live Fire Test	MIPR	PD CRAM : Redstone Arsenal, AL	0.000	0.000		0.000		0.000		3.218	Dec 2019	3.218	0.000	3.218	-
GBAD-SS OT	MIPR	ARMY : VARIOUS	0.050	0.737	Nov 2017	0.000		0.000		-		0.000	0.000	0.787	-
GBAD FWS EOV	C/FFP	Lumbee Tribe : Pembroke, NC	0.000	0.000		3.151	Apr 2019	4.727	Apr 2020	-		4.727	0.000	7.878	-
GBAD FWS EOV	C/FFP	Cherokee Nation : Tulsa, OK	0.000	0.000		0.558	Jul 2019	0.837	Jul 2020	-		0.837	0.000	1.395	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	N/A : N/A	6.223	0.000		0.000		0.000		-		0.000	0.000	6.223	-
		Subtotal	6.273	0.737		8.721		13.033		3.218		16.251	0.000	31.982	N/A

Remarks

Funding increases $4.312M from FY19 to FY20 support the initiation of the Early Operational Verification (EOV) required for MADIS Inc 1. Testing locations include Yuma Proving Grounds AZ, White Sands Missile Range NM, Crane IN and Quantico VA.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GBAD FWS Travel	Various	PMO Travel : Quantico, VA	0.000	0.000		0.275	Sep 2019	0.290	Sep 2020	-		0.290	0.000	0.565	-
GBAD FWS PMO Spt	WR	NSWC : Crane, IN	0.000	0.000		0.265	Nov 2019	0.265	Nov 2019	-		0.265	0.000	0.530	-
GBAD FWS PMO Spt	WR	NSWC : Dahlgren, VA	0.000	0.000		0.264	Nov 2018	0.264	Nov 2019	-		0.264	0.000	0.528	-
GBAD-SS Travel	Various	PMO Travel : Quantico, VA	0.298	0.098	Sep 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
GBAD-SS PMO Spt	WR	NSWC : Dahlgren, VA	0.764	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
GBAD-SS PMO Spt	C/FP	Alexandria Insights : Quantico, VA	0.000	0.566	Dec 2017	0.000		0.000		-		0.000	0.000	0.566	-
GBAD FWS PMO Spt	C/FP	Alexandria Insights : Quantico, VA	2.156	1.202	Dec 2017	0.000		0.000		-		0.000	0.000	3.358	-
Prior Years Cumulative Funding	Various	N/A : N/A	4.333	0.000		0.000		0.000		-		0.000	0.000	4.333	-
		Subtotal	7.551	1.866		0.804		0.819		-		0.819	Continuing	Continuing	N/A

Remarks

Funding increase of $0.015M from FY19 to FY20 provides vital acquisition support for a new, stand-alone, GBAD Program Office as a result of the MADIS Inc 1 program being designated as an ACAT II Program.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	91.427	28.794		89.735		49.535		15.000		64.535	Continuing	Continuing	N/A

Remarks

Overall, the Air Defense Weapons System $25.200M decrease from FY19 to FY20, in combined baseline and OCO funding, reflects GBAD Increment I called Marine Integrated Air Defense System (MADIS) which has been designated an ACAT-II program migration to procurement with a Milestone C 1st QFY-20. An IOC of 4th QFY-21 and FOC of 4QFY25.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2278 / *Air Defense Weapons System*

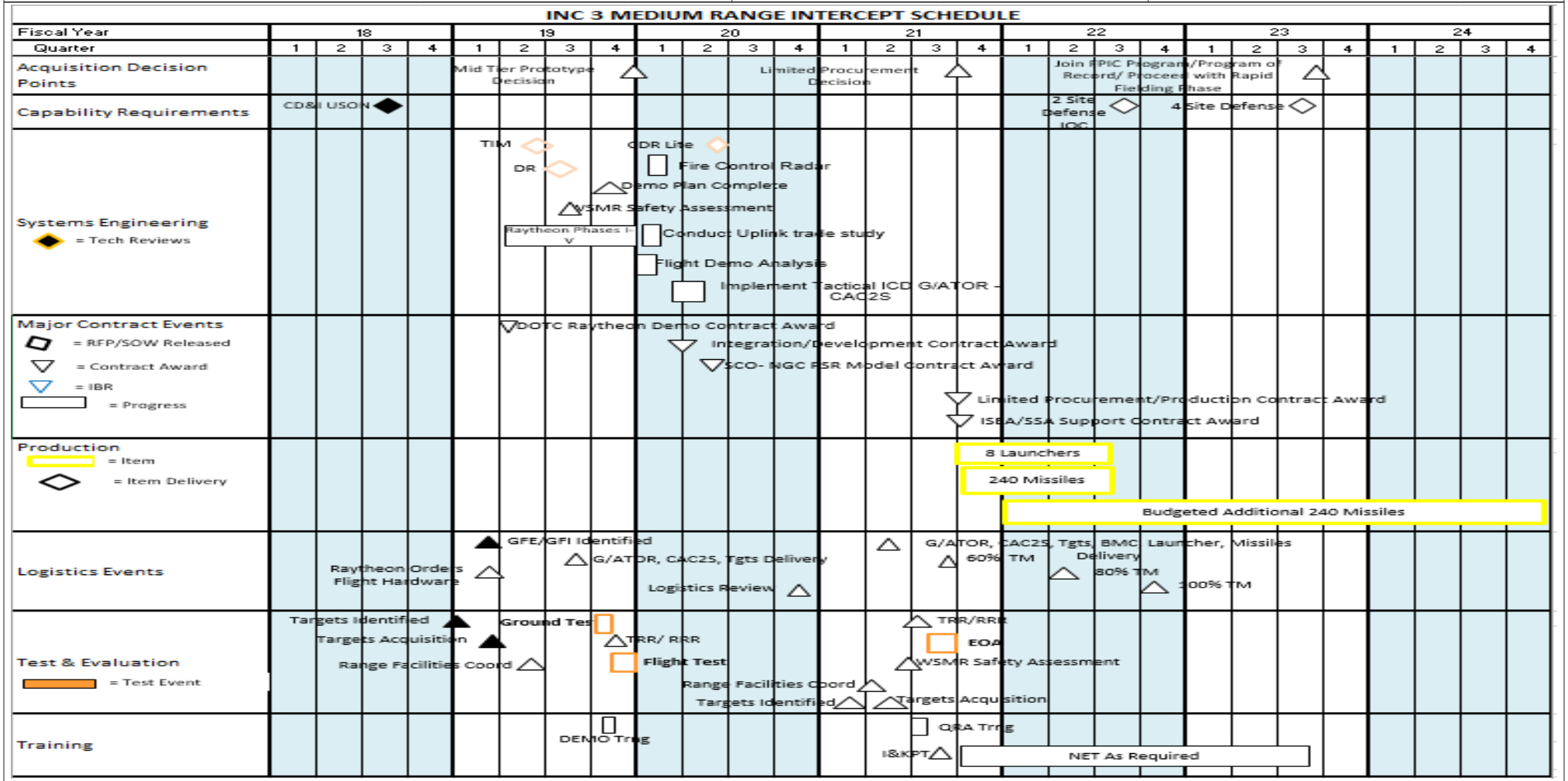

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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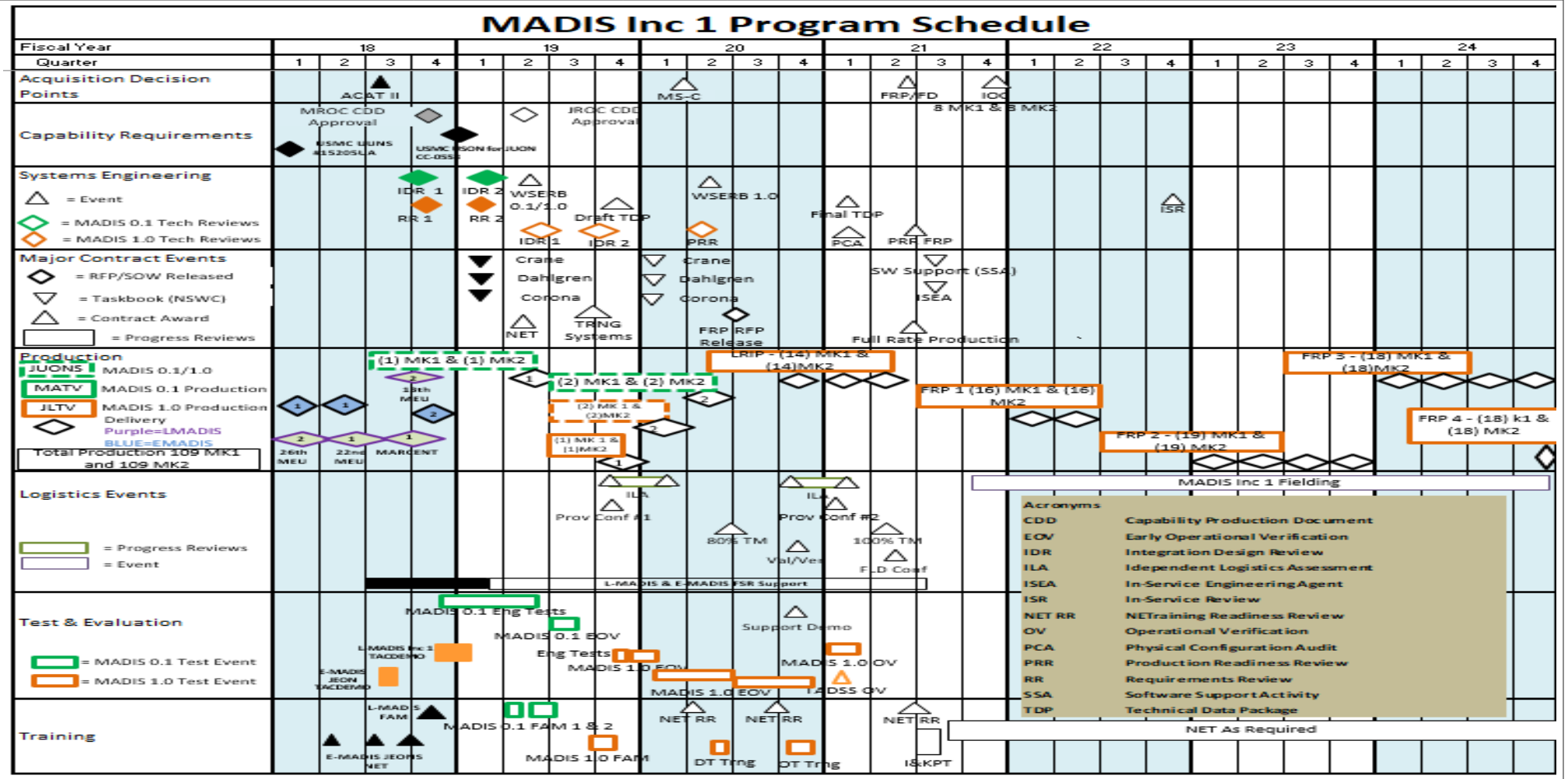

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
STINGER SLEP				
SLEP DELIVERIES	1	2018	1	2018
AMANPADS				
INC 1 FIELDING	1	2018	4	2018
IFF				
OT/FUE	2	2018	4	2018
PROCUREMENT DECISION	1	2019	1	2019
INITIAL CONTRACT AWARD	2	2019	2	2019
PRODUCTION AND DELIVERIES	2	2019	3	2022
COUNTER-UAS				
JUON/JEON ACQUISITION	1	2018	4	2020
L-MADIS INTEGRATION	4	2018	4	2019
MADIS INC 0 INTEGRATION	4	2018	1	2020
E-MADIS INTEGRATION	3	2018	2	2020
JUON TEST & EVALUATION	3	2018	4	2020
JUON TRAINING	2	2018	4	2020
MADIS INCREMENT-1				
ACQUISITION STRATEGY/ACQUISITION PLAN DEVLOPMENT	1	2018	4	2019
CAPABILITY DEVELOPMENT DOCUMENT	4	2018	4	2018
INTEGRATION DESIGN/ ENGINEERING	4	2018	4	2019
MS "C"/LRIP DECISION	1	2020	1	2020
LRIP CONTRACT AWARD	2	2020	2	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2278 / *Air Defense Weapons System*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
LRIP COMPONENT PRODUCTION/ INSTALLATION	2	2020	2	2021
EARLY OPERATIONAL VERIFICATION	1	2020	4	2020
OPERATIONAL VERIFICATION	1	2021	1	2021
FULL RATE PRODUCTION DECISION	2	2021	2	2021
FULL RATE PRODUCTION CONTRACT AWARD	2	2021	2	2021
FULL RATE COMPONENT PRODUCTION/ INSTALLATION	3	2021	4	2024
INITIAL OPERATIONAL CAPABILITY	4	2021	4	2021
INC 3 MEDIUM RANGE INTERCEPT (MRI)				
INC 3 MEDIUM RANGE INTERCEPT	1	2019	4	2024
DOTC CONTRACT AWARD (DEMO)	2	2019	2	2019
C2 SENSOR & SOFTWARE INTEGRATION	1	2019	2	2021
DEMO TRAINING	4	2019	4	2019
MRI 'CUE TO SLEW" INTEGRATION DEMO	4	2019	4	2019
MIDDLE TIER PROTOTYPE DECISION	4	2019	4	2019
ENG OPERATIONAL TEST (EOA)	3	2021	3	2021
LIMITED PROCUREMENT DECISION	3	2021	3	2021
LIMITED PRODUCTION CONTRACT AWARD	4	2021	4	2021
PRODUCTION	4	2021	4	2024
NEW EQUIPMENT TRAINING	4	2021	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*				Project (Number/Name) 2510 / *MAGTF CSSE & SE*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2510: *MAGTF CSSE & SE*	300.033	1.123	1.307	1.814	-	1.814	0.962	0.972	0.991	1.010	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

(U) The Marine Air Ground Task Force (MAGTF) Combat Service Support Element & Supporting Establishment (CSSE & SE) consists of mutually supporting Logistics Information Technology (IT) programs that support force deployment, planning, and execution; sustainment and distribution; and contributes to the Combatant Commander's Common Operating Picture to support rapid accurate decision making.

JOINT FORCE REQUIREMENTS GENERATOR II (JFRG II) is an Automated Information System (AIS) that provides the Marine Corps' the capability to plan and execute strategic force deployments in support of Joint contingency and crisis action operations and plans. It serves as the single link between Service operational force requirements and validated/sourced unit personnel and cargo data. JFRG II permits multi-level planning with entry of equipment and personnel data, transportation/ movement data, and the phasing of the total force throughout the entire movement timeline. JFRG II interfaces with the Joint Operation Planning and Execution System (JOPES) to register update and validate Time Phased Force and Deployment Data (TPFDD) within the Department of Defense chain of command. Validated deployment information is then used by U.S. Transportation Command for the scheduling of strategic transportation assets. JFRG II interfaces with the Sea Service Deployment Module (SSDM) for unit cargo information and the War Reserve System (WRS) in order to register sustainment requirements. JFRG II can generate standard, executive, and ad hoc reports and perform database queries to support information requirements. JFRG II operates and functions in a classified environment.

BASE TELECOMMUNICATIONS INFRASTRUCTURE (BTI) provides all Marine Corps installations with the base area network communications infrastructure that connects the end-user to the DISA network. BTI modernizes, sustains, upgrades and enhances the telecommunications systems infrastructure for all Marine Corps Installations in order to meet the demands required to support the 5th Element of the Marine Air Ground Task Force (MAGTF). BTI is designed to maintain current industry standards as they relate to technological capabilities for all voice, video and data services and are transported via each installation's infrastructure. These data services include, support for but are not limited to: Enhanced 911 (E911), Video-Teleconferencing, Integrated Services Digital Network, Marine Corps Enterprise Network, Energy Monitoring Control Systems, Intrusion Detection Systems, Access Control Systems, Fire Alarm Control Networks and Fleet Training Systems. This includes supporting systems such as optical networks, telecommunications management systems, primary power, voice mail, teleconferencing, and outside plant infrastructure. The ongoing focus is technology refresh and standardization on DISA Unified Capabilities (UC) (voice, video, collaboration, and data) through modernization of installation infrastructure in order to maintain connection to the DISA network.

MAGTF LOGISTICS SUPPORT SYSTEMS (MLS2): Composed of several main components including the Electronic Maintenance Support System (EMSS). EMSS is a rugged organizational-level (O-level), light-weight, one-man portable maintenance device capable of supporting multiple platforms and systems across maintenance communities. It provides a Commercial Off-The-Shelf (COTS) hardware device equipped with Built-In-Test/Built-In-Test Equipment (BIT/BITE) interfaces, and Software Defined Test Instrument (SDTI) General Purpose Electronic Test Equipment (GPETE) capabilities. These hardware capabilities will enable commercial or custom DoD and USMC software capabilities including Interactive Electronic Technical Manuals (IETMs), Computer Based Training (CBT), and other maintenance applications to be hosted on EMSS. EMSS also has the capability to connect to the Marine Corps Enterprise Network (MCEN) and access sites like Global Combat Support System -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

Marine Corps (GCSS-MC) in order to facilitate maintenance and supply transactions, thereby improving readiness. With these capabilities, maintainers will make more informed decisions and sustain force readiness over time.

The FY19 to FY20 increase of $0.507M is principally due to JFRG II updating from Ozone Widget Framework to Ozone Widget Framework Version 8.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: JOINT FORCES REQUIREMENT GENERATION II (JFRG II)	0.198	0.197	1.161	0.000	1.161
Articles:	-	-	-	-	-
FY 2019 Plans: -Initiated Engineering Change Proposals (ECPs)to increase user functionality.					
FY 2020 Base Plans: -Continue Engineering Change Proposals (ECPs), initiate platform update from Ozone Widget Framework (OWF) to Ozone Widget Framework Version 8) and initiate Cross Domain Solution Development.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The FY19 to FY20 increase of $.964M supports the platform update from Ozone Widget Framework to Ozone Widget Framework Version 8.					
Title: BASE TELECOM (BTI)	0.000	0.458	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: Completed test and evaluation (T&E) engineering support for Defense Information Systems Agency (DISA) Unified Capabilities (UC) (voice, video, collaboration, and data) implementation.					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funding decrease of $0.458M from FY 2019 to FY 2020 reflects BTI's RDTEN efforts transitioning to post fielding engineering support and analysis.					
Title: MAGTF LOGISTICS SUPPORT SYSTEMS (MLS2)	0.925	0.652	0.653	0.000	0.653
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to develop Wireless Access Module (WAM) prototypes in order to enable organic level maintenance on LAV, Tank, AAV, and Heavy Equipment weapon systems. - Initiate efforts to develop software applications for the Health Management System (HMS) in order to push and pull data, conduct software configuration management, and generate maintenance reports. - Initiate efforts to develop government off the shelf (GOTS) diagnostic software capabilities for Heavy Equipment and Motor Transport weapon systems in order to decrease their life cycle costs.					
FY 2020 Base Plans: - Continue to develop additional GOTS diagnostic software capability for additional Heavy Equipment, Motor Transport, and Ordnance weapon systems in order to enhance maintenance capabilities, migrate away from more expensive commercial off the shelf (COTS) solutions, and decrease total ownership cost (TOC) for supported platforms.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The $.001M increase from FY19 to FY20 reflects additional GOTS diagnostic software development and enhancements for Ordnance supported weapon systems.					
Accomplishments/Planned Programs Subtotals	1.123	1.307	1.814	0.000	1.814

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/BLI 463500 BTI: *BTI*	26.152	45.720	14.897	-	14.897	30.217	72.596	83.722	82.402	Continuing	Continuing
• PMC/BLI 418100: *MAGTF Logistics Support Systems*	7.624	10.453	10.540	-	10.540	12.358	12.473	12.527	12.778	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

D. Acquisition Strategy

JOINT FORCES REQUIREMENT GENERATOR II (JFRG II) is required to modernize in order to implement Joint Requirements Oversight Counsel (JROC) mandates in support of Adaptive Planning and Execution (APEX) including the inclusion of Global Force Management - Data Initiative (GFM-DI) data elements and Joint Command and Control (JC2) Capabilities Development Document (CDD) requirements. The JFRG II legacy software application will remain supported until end of life (EOL) in FY19 when it will be replaced by the modernized version. Future capability improvements as identified in the JC2 CDD will be implemented through the configuration management process.

BASE TELECOMMUNICATIONS INFRASTRUCTURE (BTI) provides all Marine Corps installations with the base area network communications infrastructure that connects the end-user to the DISA network. BTI modernizes, sustains, upgrades and enhances the telecommunications systems infrastructure for all Marine Corps Installations in order to meet the demands required to support the 5th Element of the Marine Air Ground Task Force (MAGTF). Participation in the DISA Unified Capabilities Master Plan (voice, video, collaboration, and data) is critical to BTI modernization strategy. The RDT&E funds will be utilized for analysis, research and evaluation of Unified Capabilities (UC) (voice, video, collaboration, and data) implementation efforts.

MAGTF LOGISTICS SUPPORT SYSTEMS (MLS2) is pursuing an evolutionary acquisition strategy in order to sustain operationally suitable and supportable capability across the Marine Corps as a maintenance aid. Electronic Maintenance Support Systems must evolve in concert with the supported platforms maintenance philosophy to provide extended functionality and access to network connectivity.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 2510 / *MAGTF CSSE & SE*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JFRG II	C/IDIQ	SAIC : Stafford, VA	2.293	0.198	Dec 2018	0.197	Aug 2019	1.161	Aug 2020	-		1.161	Continuing	Continuing	Continuing
EMSS/MAGTF Logistics Support Systems	WR	NSWC, Crane : Crane, IN	0.540	0.925	Feb 2018	0.652	Feb 2019	0.653	Feb 2020	-		0.653	0.000	2.770	-
Prior Years Cumulative Funding	Various	Various : Various	283.253	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	286.086	1.123		0.849		1.814		-		1.814	Continuing	Continuing	N/A

Remarks

The FY19 to FY20 increase supports the platform update from Ozone Widget Framework to Ozone Platform for JFRG II.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	8.214	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	8.214	0.000		0.000		0.000		-		0.000	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
BTI	MIPR	MITRE : Aberdeen Proving Ground, MD	1.590	0.000		0.458	Jan 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Prior Years Cumulative Funding	Various	Various : Various	4.143	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	5.733	0.000		0.458		0.000		-		0.000	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	300.033	1.123		1.307		1.814		-		1.814	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

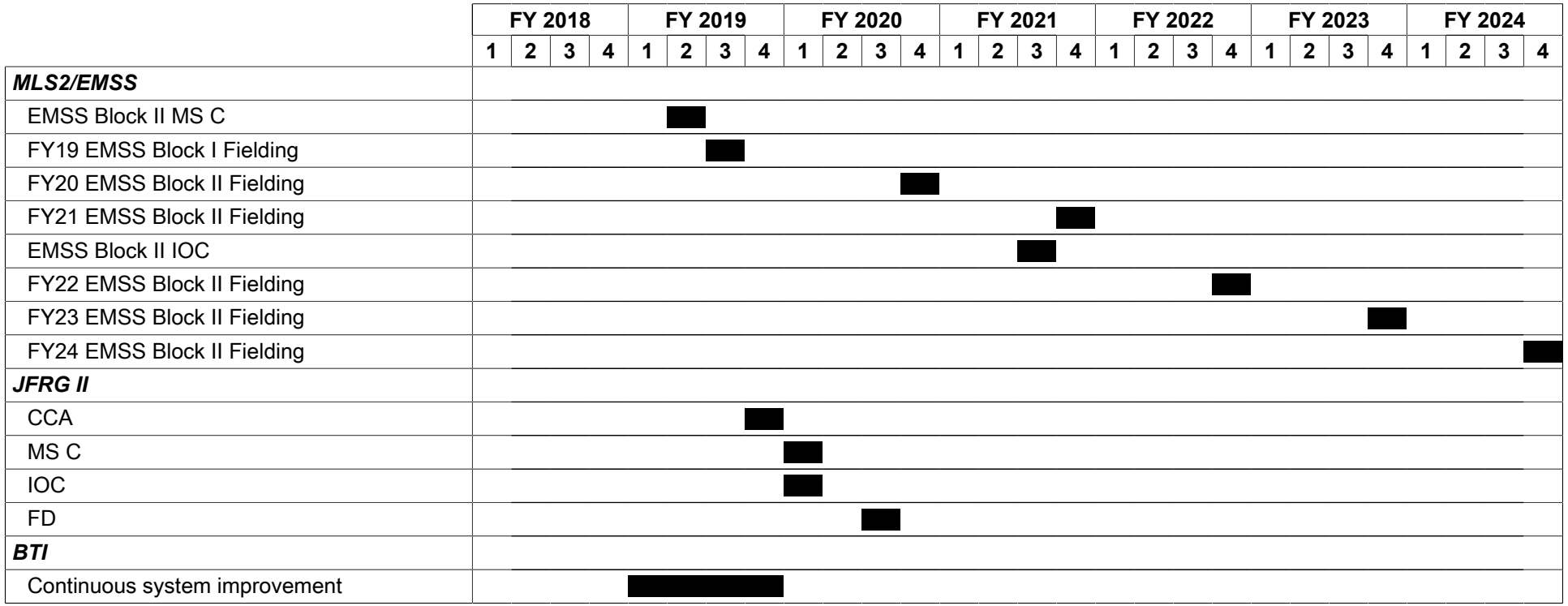

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MLS2/EMSS				
EMSS Block II MS C	2	2019	2	2019
FY19 EMSS Block I Fielding	3	2019	3	2019
FY20 EMSS Block II Fielding	4	2020	4	2020
FY21 EMSS Block II Fielding	4	2021	4	2021
EMSS Block II IOC	3	2021	3	2021
FY22 EMSS Block II Fielding	4	2022	4	2022
FY23 EMSS Block II Fielding	4	2023	4	2023
FY24 EMSS Block II Fielding	4	2024	4	2024
JFRG II				
CCA	4	2019	4	2019
MS C	1	2020	1	2020
IOC	1	2020	1	2020
FD	3	2020	3	2020
BTI				
Continuous system improvement	1	2019	4	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*				Project (Number/Name) 3099 / *Radar System*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3099: *Radar System*	192.155	9.520	16.435	13.708	-	13.708	5.651	1.462	1.498	1.528	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

In FY19, Family of Target Acquisition Systems (FTAS) funding transitioned from project 3099 Radar Systems to project 3773 Fire Coordination and Sensors. Realignment of efforts in FY19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC Operation Forces.

A. Mission Description and Budget Item Justification

Long Range Radar (AN/TPS-59) - The AN/TPS-59A(V)3 is a transportable, three dimensional, tactical radar system that provides the Marine Air Ground Task Force (MAGTF) with long-range surveillance. It is the MAGTF's only ground based long range sensor that provides the capability to detect and report Air Breathing Targets (ABT) and track Theater Ballistic Missiles (TBM). The AN/TPS-59A(V)3 Radar System is connected to the Common Aviation Command and Control Systems (CAC2S). It provides the air defense controllers data and may be used autonomously to conduct Ground Control Intercept, tactical en-route Air Traffic Control (ATC), or TBM alert operations via the Joint Integrated Air Missile Defense (IAMD) encrypted Link-16. The USMC extended the AN/TPS-59 service life through 2035; therefore, in order to maintain its operational relevance on the battlefield, a number of modernization efforts were initiated in FY17. The Digital Receiver and Exciter (DREX) upgrade will convert the analog receivers and exciters to digital to address Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues, enable spectral agility, reduce noise, reduce false alarms, and enhance Electronic Counter-Countermeasures (ECCM) capability. This effort will include an essential simulation and test environment capability. Post Deployment Software Support (PDSS) funds the DREX software integration merge into the tactical system baseline.

Family of Target Acquisition Systems (FTAS) - The FTAS provides the MAGTF the capability to locate, identify, and attack enemy indirect fire weapons systems and observe and direct friendly artillery fire. The FTAS consists of the AN/TPQ-46 Firefinder Radar, the AN/TPQ-49 Lightweight Counter Mortar Radar, and the AN/TSQ-267 Target Processing Set. The FTAS is critical in the execution of counterfire and the integration of target acquisition information enabling attack by MAGTF assets. The FTAS also provides artillery firing units the ability to conduct artillery registration and other friendly fire missions. The FTAS encompasses the equipment required to support target acquisition within the target acquisition platoon and is resident in the headquarters battery of each artillery regiment. The program will continue to address system issues that arise due to DMSMS items within the FTAS. The USMC assumed the role of Primary Inventory Control Activity (PICA) for the AN/TPQ-49 in FY15 when the Army divested itself from the system. FTAS transitions from Project C3099 to C3773 beginning in FY19.

Virtual Warfare Center (VWC) Support - The project team conducts fully interactive simulated war games at the Virtual Warfare Center (VWC) in St. Louis, MO, in order to quantify family of systems performance and how it impacts effectiveness in the Integrated Air and Missile Defense (IAMD) mission area. The VWC provides a venue for the exploration of advanced engagement concepts focused on persistent forward naval engagements in support of the MAGTF and the development of associated Joint and Service specific tactics, techniques, and procedures (TTPs). VWC support encompasses a set of integrated fire control (IFC) activities that also includes concept/CONOPS development, family of systems architecture development, and systems engineering/integration efforts.

The overall program decrease of $2.727M is principally due to TPS-59's deferment of certain modernization efforts except for those critical to preventing obsolescence.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3099 / *Radar System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: AN/TPS-59: Product Development	2.403	7.736	5.567	0.000	5.567
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue enhanced software development for Tactical Ballistic Missile (TBM) detection. - Continue DREX Engineering Design Model (EDM) Development. ***FY 2020 Base Plans:*** - Initiates the Array Row Transmitter Technical Refresh which will increase radar detection ability, reduce power consumption and address obsolescence. - Initiates Mode 5 Level II updates which will increase capability for command and control of aircraft Identification of Friend or Foe (IFF) systems. - Supports development of Radar Environmental Simulator (RES) Logistics Products such as, technical manuals and training packages. - Continues enhanced software development for post deployment software support efforts TBM detection. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $2.169M from FY19 to FY20 reflects USMC decision to defer all modernization except the IFF Mode 5/S level 1 upgrade and upgrades specifically to prevent system obsolescence.					
Title: AN/TPS-59: Support	2.396	4.275	3.614	0.000	3.614
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiate test and evaluation support for Digital Receiver and Exciter (DREX), and Post Deployment Software Support enhancements. - Continue developmental engineering support for DREX. ***FY 2020 Base Plans:*** - Continues Engineering and Test Support for Digital Receiver Exciter (DREX), and Post Deployment Software Support enhancements. - Initiates Array Row Transmitter Technical Refresh and Mode 5 Level II engineering development efforts. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3099 / *Radar System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $.661M from FY19 to FY20 reflects USMC decision to defer all modernization except the IFF Mode 5/S level 1 upgrade and upgrades specifically to prevent system obsolescence.					
Title: AN/TPS-59: Test and Evaluation	0.273	1.396	1.236	0.000	1.236
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiate test and evaluation of the Digital Receiver and Exciter (DREX) Engineering Design Module (EDM). ***FY 2020 Base Plans:*** - Completes DREX developmental testing (DT) for successful transition into production. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.160M from FY19 to FY20 reflects USMC decision to defer all modernization except the IFF Mode 5/S level 1 upgrade and upgrades specifically to prevent system obsolescence.					
Title: AN/TPS-59: Management Services	0.000	1.900	1.900	0.000	1.900
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiate support from MITRE for enhanced data analysis and engineering modeling of threat profiles to support the tactical ballistic missile software enhancements and current operational threats. ***FY 2020 Base Plans:*** - Continues MITRE Technical Support which provides expertise necessary to support the radar systems, and provide analysis of test data to validate system performance. ***FY 2020 OCO Plans:*** N/A					
Title: FTAS: Product Development	1.180	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3099 / *Radar System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- See Project C3773. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: FTAS: Test and Evalution ***Articles:*** ***FY 2019 Plans:*** - See Project C3773. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	0.035 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: VWC: Support ***Articles:*** ***FY 2019 Plans:*** - Continue to simulate war games at the VWC in St. Louis, MO, in order to quantify family of systems performance and how it impacts effectiveness in the IAMD mission area. ***FY 2020 Base Plans:*** - Will continue to simulate war games at the VWC in St. Louis, MO, in order to quantify family of systems performance and how it impacts effectiveness in the IAMD mission area. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $.147M from FY19 to FY20 supports USMC fair share costs to support VWC efforts.	1.905 -	0.813 -	0.960 -	0.000 -	0.960 -
Title: VWC: Test and Evaluation ***Articles:*** ***FY 2019 Plans:***	1.328 -	0.315 -	0.431 -	0.000 -	0.431 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3099 / *Radar System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue to simulate war games at the VWC in St. Louis, MO, in order to quantify family of systems performance and how it impacts effectiveness in the IAMD mission area. ***FY 2020 Base Plans:*** - Will continue to simulate war games at the VWC in St. Louis, MO, in order to quantify family of systems performance and how it impacts effectiveness in the IAMD mission area. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $.118M from FY19 to FY20 supports USMC fair share costs to support VWC efforts.					
Accomplishments/Planned Programs Subtotals	9.520	16.435	13.708	0.000	13.708

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4650-1: *AN/TPS-59*	9.676	6.694	0.329	-	0.329	5.315	6.469	8.142	0.000	Continuing	Continuing
• PMC/4650-2: *FTAS*	5.135	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	34.276
• PMC/4650-3: *SHORAD (AN/TPS-63)*	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.447
• RDTE/C3773: *FTAS*	0.000	1.626	1.629	-	1.629	1.660	1.687	1.721	1.755	0.000	10.078
• PMC/4733: *FTAS*	0.000	2.867	2.943	-	2.943	3.002	3.061	3.122	3.184	Continuing	Continuing

Remarks

FTAS RDTE transitions from Project C3099 to C3773 in FY19.

D. Acquisition Strategy

Long Range Radar (AN/TPS-59) - Due to the proprietary nature of the software, the AN/TPS-59 Program will utilize a sole source contract with the OEM for software and Digital Receiver and Exciter development. The AN/TPS-59 Program will utilize full and open competition to the max extent possible on areas that do not have proprietary restrictions.

Family of Target Acquisition Systems (FTAS) - The Family of Target Acquisition Systems consists of 3 major components: AN/TPQ-46, AN/TPQ-49 and the AN/TSQ-267. Of these 3 systems, the AN/TPQ-46 is due to be replaced by the Ground/Air Task Oriented Radar (G/ATOR) beginning in 2019. Sustainment activities during 2016 and beyond will be limited to maintain the authority to operate (ATO) creditation. Sustainment activities on the AN/TPQ-49 are escalating due to the fact

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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the US Army divested from the AN/TPQ-49, the USMC has assumed the responsibilities of the primary inventory control activity (PICA). Program Office will conduct an engineering change to the AN/TPQ-49 to provide the operating forces with a mobile, stand-alone configuration. Sustainment activities on the AN/TPQ-46 will begin to escalate due to the US Army divestiture from the AN/TPQ-36. The USMC will assume some sustainment responsibilities for the AN/TPQ-46 until replaced by G/ATOR. Additionally, the AN/TSQ-267 requires hardware updates in order to continue housing the suite of equipment that supports the Target Processing Center (TPC) activities.

Virtual Warfare Center (VWC) Support - The project team conducts fully interactive simulated war games at the Virtual Warfare Center (VWC) in St. Louis, MO, in order to quantify family of systems performance and how it impacts effectiveness in the Integrated Air and Missile Defense (IAMD) mission area. VWC support encompasses a set of integrated fire control (IFC) activities that also includes concept/CONOPS development, family of systems architecture development, and systems engineering/integration efforts. The Office of Naval Research (ONR) is the lead for all VWC contracting actions.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 3099 / *Radar System*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 - DREX EDM Development	SS/CPFF	LMC : SYRACUSE, NY	3.254	0.000		4.008	Dec 2018	3.297	Dec 2019	-		3.297	0.000	10.559	-
AN/TPS-59 - DREX EDM Development Program Management	SS/CPFF	LMC : SYRACUSE, NY	1.409	0.000		0.334	Sep 2019	2.270	Nov 2019	-		2.270	0.000	4.013	-
AN/TPS-59 - Enhanced Software Development	SS/CPFF	LMC : SYRACUSE, NY	1.426	2.403	Aug 2018	3.394	Jul 2019	0.000		-		0.000	0.000	7.223	-
FTAS	MIPR	TYAD : TOBYHANNA, PA	0.593	1.180	Mar 2018	0.000		0.000		-		0.000	0.000	1.773	-
Prior Year Cumulative Funding	Various	VARIOUS : VARIOUS	84.632	0.000		0.000		0.000		-		0.000	0.000	84.632	-
		Subtotal	91.314	3.583		7.736		5.567		-		5.567	0.000	108.200	N/A

Remarks

- Decrease of $2.169M from FY19 to FY20 due to divestment.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 - Government Engineering Support	WR	NSWC : PORT HUENEME, vCA	0.866	0.000		0.615	Nov 2018	0.000		-		0.000	0.000	1.481	-
AN/TPS-59 - GFE for Test Asset	C/CPFF	LMC : SYRACUSE, NY	1.034	0.000		0.770	Jul 2019	0.000		-		0.000	0.000	1.804	-
AN/TPS-59 - Engineering Support	C/FFP	MCSC : QUANTICO, VA	0.000	0.000		2.890	Nov 2018	3.614	Nov 2019	-		3.614	0.000	6.504	-
AN/TPS-59 - Engineering Support	SS/CPFF	LMC : SYRACUSE, NY	0.000	2.396	Jun 2018	0.000		0.000		-		0.000	0.000	2.396	-
VWC	C/CPFF	ONR : ST. LOUIS, MO	19.921	1.905	Feb 2018	0.813	Feb 2019	0.960	Feb 2020	-		0.960	Continuing	Continuing	Continuing
Prior Year Cumulative Funding	Various	VARIOUS : VARIOUS	48.391	0.000		0.000		0.000		-		0.000	0.000	48.391	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	70.212	4.301		5.088		4.574		-		4.574	Continuing	Continuing	N/A

Remarks

- Decrease of $3.614M from FY19 to FY20 supports due to divestment.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 - Test & Evaluation	C/CPFF	NSWC, Corona : CORONA, CA	0.000	0.273	Aug 2018	1.396	Aug 2019	0.419	Aug 2020	-		0.419	0.000	2.088	-
AN/TPS-59 - GFE for Test Asset	C/CPFF	LMC : SYRACUSE, NY	0.000	0.000		0.000		0.817	Jun 2020	-		0.817	0.000	0.817	-
FTAS	WR	MCTSSA : SAN DIEGO, CA	0.680	0.035	Feb 2018	0.000		0.000		-		0.000	0.000	0.715	-
VWC	C/CPFF	ONR : ST. LOUIS, MO	0.000	1.328	May 2018	0.315	May 2019	0.431	May 2020	-		0.431	0.000	2.074	-
Prior Year Cumulative Funding	Various	VARIOUS : VARIOUS	3.968	0.000		0.000		0.000		-		0.000	0.000	3.968	-
		Subtotal	4.648	1.636		1.711		1.667		-		1.667	0.000	9.662	N/A

Remarks

- Decrease of $0.015M from FY19 to FY20 due to divestment.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 Engineering Support	MIPR	MITRE : BEDFORD, MA	0.000	0.000		1.900	Dec 2018	1.900	Oct 2019	-		1.900	0.000	3.800	-
Prior Year Cumulative Funding	Various	VARIOUS : VARIOUS	25.981	0.000		0.000		0.000		-		0.000	0.000	25.981	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3099 / *Radar System*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			25.981	0.000		1.900		1.900		-		1.900	0.000	29.781	N/A

Remarks

- Decrease of $1.665M from FY19 to FY20 due to divestment.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	192.155	9.520		16.435		13.708		-		13.708	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3099 / *Radar System*

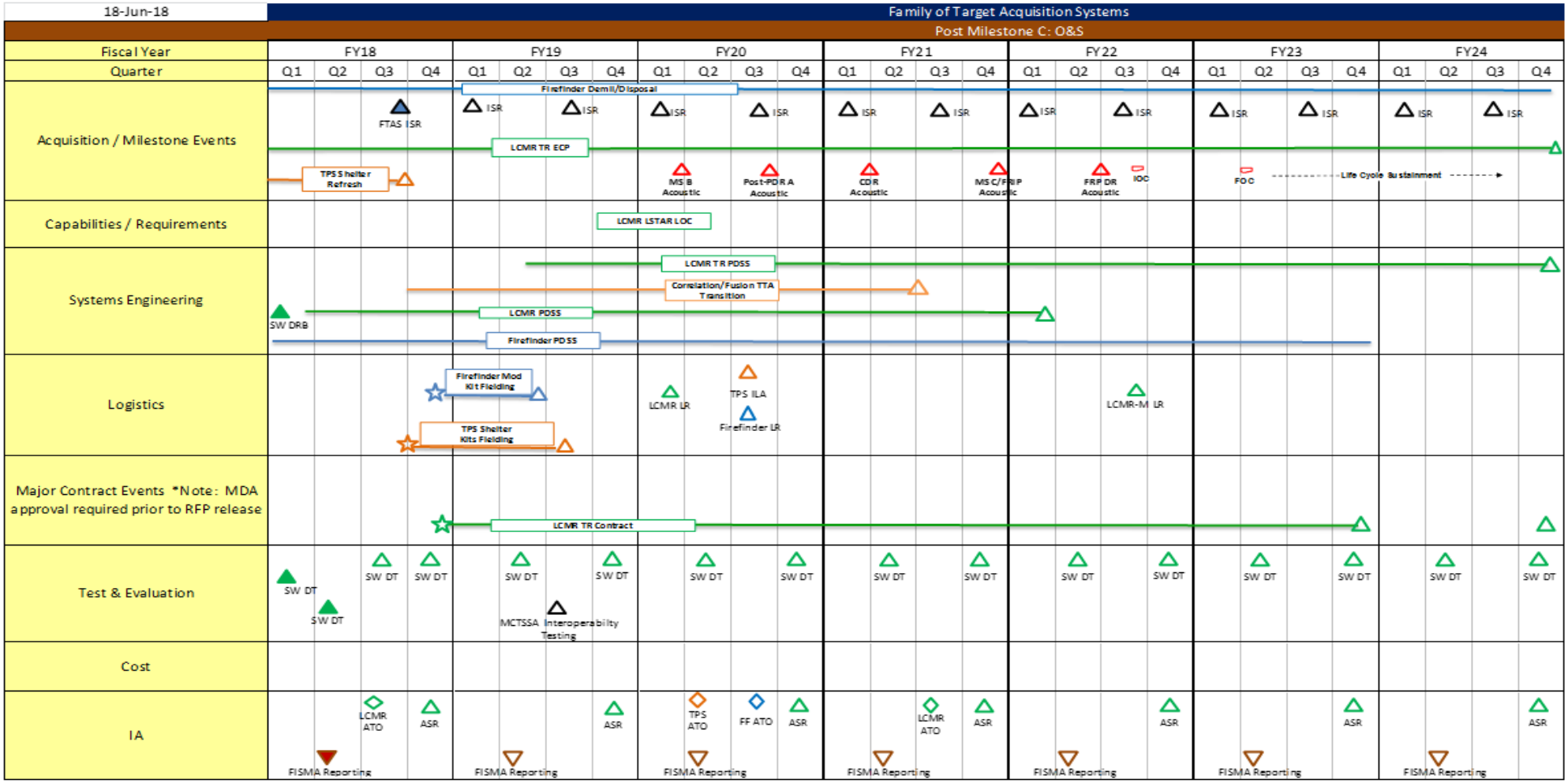

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3099 / *Radar System*

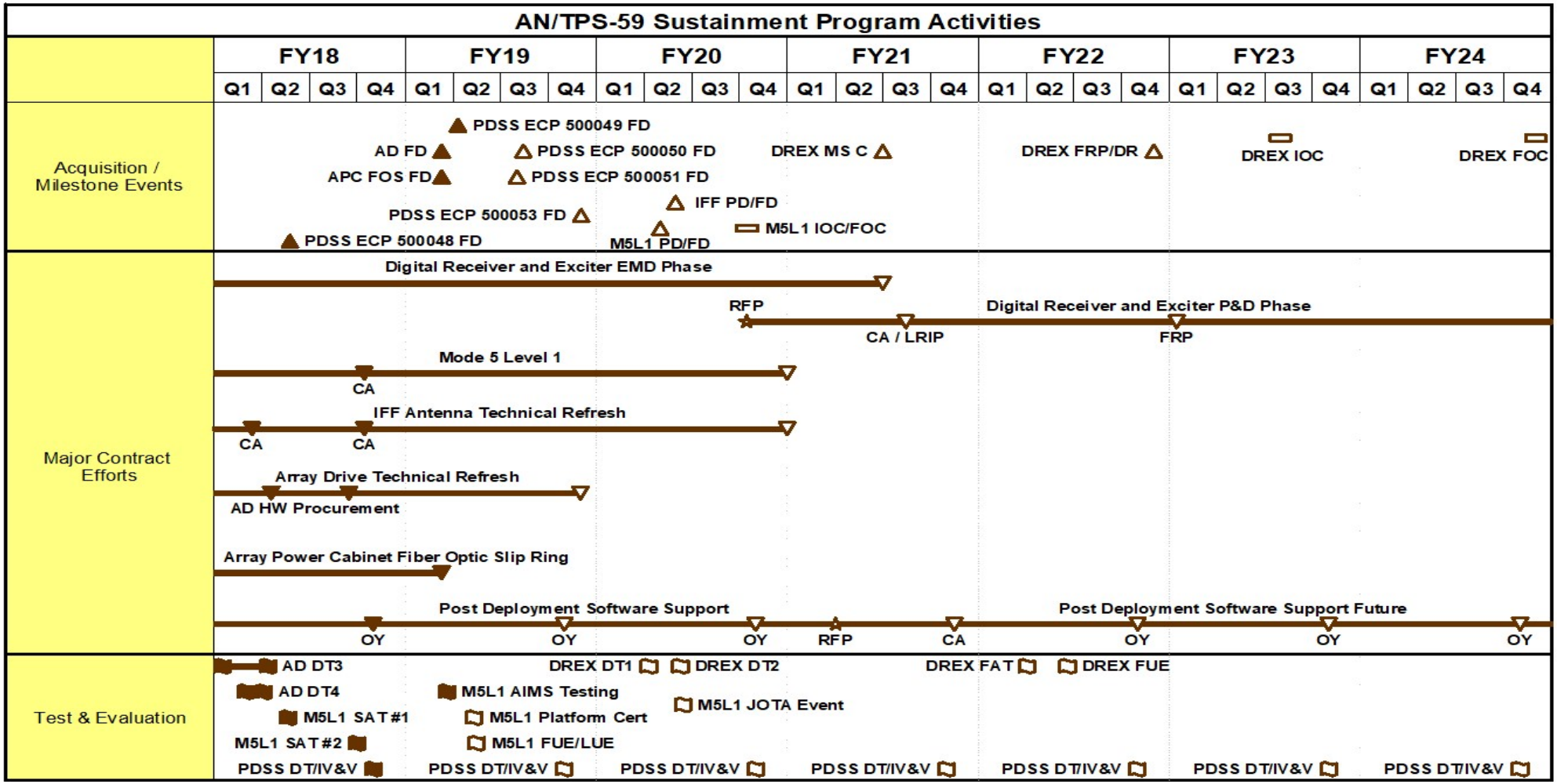

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3099 / *Radar System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3099				
AN/TPS-59 IFF Contract Award	1	2018	1	2018
AN/TPS-59 PDSS Inc 2 Fielding Decision	2	2018	2	2018
AN/TPS-59 IFF Fielding Decision	1	2019	1	2019
AN/TPS-59 PDSS ECP Fielding Decision	1	2019	1	2019
AN/TPS-59 PDSS Option Year Award	4	2019	4	2019
AN/TPS-59 PDSS Final Option Year Award	4	2020	4	2020
AN/TPS-59 DREX DT1	1	2020	1	2020
AN/TPS-59 M5L1 JOTA Test Event	2	2020	2	2020
FTAS - TPS Shelter Refresh FOC	3	2018	3	2018

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206313M / *Marine Corps Comms Systems*	Project (Number/Name) 3772 / *Information Related Capabilities (IRC)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3772: *Information Related Capabilities (IRC)*	0.000	0.000	4.188	4.791	-	4.791	3.310	2.002	2.261	2.306	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, Marine Civil Information Management System (MARCIMS), Public Affairs System (PAS) and Military Information Support Operations (MISO) funding has been realigned from project 2277, System Engineering & Integration. Realignment of efforts to new projects in FY19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

Marine Civil Information Management System (MARCIMS) is a system of systems comprised of people, process and technology that operates in the full Joint, Interagency, Intergovernmental, and Multinational (JIIM) environment. It is a force multiplier for the commander that allows him to leverage the process of Planning, Collection, Consolidation, Analysis, Production, and sharing of civil information in order to support the visualization and understanding of the civil environment to the military commander's decision making process. This program transitions from C2277 to C3772 in FY19.

Public Affairs System (PAS) provides the Marine Air Ground Task Force (MAGTF) and the broader Marine Corps the capability to research, understand and affect the information environment. PA Marines and Systems enable commanders at all levels and across the range of military operations to engage domestic and foreign publics whose trust, confidence, and understanding are mission critical. The Public Affairs Systems (PAS) AAP identifies and fields materiel solutions required to research and plan communication initiatives, acquire still and video visual information, produce and disseminate communication products, and assess the effects of communication initiatives within the information environment. The program maintains an evolutionary approach to acquisitions, and leverages commercial industry-standard non-developmental items to provide the best value to the Marine Corps, while keeping PA Marines appropriately equipped to understand and affect the information environment. This effort supports research and evaluate solutions to modernize the Public Affairs Still Acquisition System into a single handheld device with the capability to acquire, edit and transmit still and video imagery and engage publics via traditional and social media. This program transitioned from C2277 to C3772 in FY19.

The Military Information Support Operations (MISO) Family of Systems (FOS), which consists of the Fly-Away Broadcast System (FABS), Next-Generation Loud Speaker (NGLS), Radio-In-A-Box (RIAB), and Marine Corps SOF Integration Node (MISN), provides the Marine Air Ground Task Force (MAGTF) Commander the capability to conduct planned operations to convey selected information and indicators to foreign adversary, neutral and friendly target audiences to influence their emotions, motives, objective reasoning, providing an operational advantage. The MISO was established in response to multiple Marine Requirements Oversight Council Memorandums, and the approval of a MISO Organizational and Operational (O&O) Concept, 16 June 2015. MISO capabilities are critical to the success of the MAGTF mission, enabling commanders to shape the information environment, counter enemy propaganda, misinformation, disinformation, and adversarial narratives. The Signature Management (SIGMAN) capability will support MAGTF Operations with a baseline capability to include Own-force signature monitoring and assessment, Electromagnetic signature masking and projection, and physical decoys. This program transitioned from C2277 to C3772 in FY19.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3772 / *Information Related Capabilities (IRC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Public Affairs System (PAS): Product Development	0.000	0.092	0.390	0.000	0.390
Articles:	-	-	-	-	-
Description: Program transitioned from Project 2277 to 3772 in FY19. ***FY 2019 Plans:*** -Continue the research and evaluation of solutions to modernize the Public Affairs Live Media Engagement System (PALMES) with the capability to transmit imagery and engage publics via traditional and social media via Military Satellite Communications (MILSATCOM). These actions will include the evaluation of device solutions and research of information assurance requirements to accredit the Public Affairs transmission capability. ***FY 2020 Base Plans:*** - Initiate procurement of Public Affairs Live Media Engagement System (PALMES) Next Generation test asset. - Procure test articles in support of the next generation of the Public Affairs Tablet (PAT). - Continued research and evaluation of PALMES in support of modernization and incorporation of the capability to transmit imagery and engage publics via traditional and social media via Military Satellite Communications (MILSATCOM). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.298M from FY19 to FY20 reflects procurement of PALMES and PAT test assets in support of modernization efforts.					
Title: Military Information Support Operations (MISO): Product Development	0.000	1.080	2.062	0.000	2.062
Articles:	-	-	-	-	-
Description: The MISO Family of Systems (FOS), which consists of the Fly-Away Broadcast System (FABS), Next-Generation Loud Speaker (NGLS), Radio-In-A-Box (RIAB), and Marine Corps SOF Integration Node (MISN), provides the Marine Air Ground Task Force (MAGTF) Commander the capability to conduct planned operations to convey selected information and indicators to foreign adversary, neutral and friendly target audiences to influence their emotions, motives, objective reasoning, providing an operational advantage. FY18 initiates product development of the Fly-Away Broadcast System (FABS) in preparation for a MS C decision. ***FY 2019 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3772 / *Information Related Capabilities (IRC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue engineering and manufacturing development of the Fly-Away Broadcast System (FABS). - Initiate research and development efforts for Signature Management (SIGMAN) and tactical deception capabilities. ***FY 2020 Base Plans:*** - Initiate Air integration efforts for FABS - Continue research and development efforts for Signature Management (SIGMAN) and tactical deception capabilities. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.982M from FY19 to FY20 is due to the initiation of air integration efforts for FABS.					
Title: MISO: Test and Evaluation	0.000	3.016	1.900	0.000	1.900
Articles:	-	3	-	-	-
Description: The MISO Family of Systems (FOS), which consists of the Fly-Away Broadcast System (FABS), Next-Generation Loud Speaker (NGLS), Radio-In-A-Box (RIAB), and Marine Corps SOF Integration Node (MISN), provides the Marine Air Ground Task Force (MAGTF) Commander the capability to conduct planned operations to convey selected information and indicators to foreign adversary, neutral and friendly target audiences to influence their emotions, motives, objective reasoning, providing an operational advantage. FY18 initiates product development of the Fly-Away Broadcast System (FABS) in preparation for a MS C decision. ***FY 2019 Plans:*** - Initiate test and evaluation activities for Fly-Away Broadcast System (FABS). - Initiate procurement of 3 test assets (Light, Medium, Heavy) ***FY 2020 Base Plans:*** - Continue research and development efforts of the Fly-Away Broadcast System in support of production verification and user evaluation. - Initiate research and development of Signature Management (SIGMAN) and tactical deception capabilities ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3772 / *Information Related Capabilities (IRC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $1.116M from FY19 reflects completion of FABS testing.					
Title: MARCIMS: Product Development	0.000	0.000	0.439	0.000	0.439
Articles:	-	-	-	-	-
Description: Marine Civil Information Management System (MARCIMS) is a system of systems comprised of people, process and technology that operates in the full Joint, Interagency, Intergovernmental, and Multinational (JIIM) environment. It is a force multiplier for the commander that allows him to leverage the process of Planning, Collection, Consolidation, Analysis, Production, and sharing of civil information in order to support the visualization and understanding of the civil environment to the military commander's decision making process. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** - Continue development of MARCIMS 2.0 - Conduct test and identification of the next generation of MARCIMS mobile devices ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.439M from FY19 to FY20 reflects MARCIMS every-other-year test schedule in support of system refresh.					
Accomplishments/Planned Programs Subtotals	0.000	4.188	4.791	0.000	4.791

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4620AA: *MARCIMS*	0.000	0.296	0.000	-	0.000	0.302	0.000	0.308	0.314	Continuing	Continuing
• PMC/4620BB: *PAS*	3.482	0.917	0.691	-	0.691	0.710	0.722	0.736	0.751	Continuing	Continuing
• PMC/4620CC: *MISO*	0.000	2.976	8.364	-	8.364	9.924	9.938	7.853	8.010	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3772 / *Information Related Capabilities (IRC)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

MARCIMS, PAS, MISO transition from 2277 to 3772 in FY19.

D. Acquisition Strategy

MARCIMS will continue to support and sustain the current baseline system, while employing incremental changes to ensure that the system not only meets current requirements per the Letter of Clarification, but also allows for a more user friendly system. MARCIMS plans to begin development of MARCIMS 2.0 in a partnership with the Office of Naval Research (ONR), while simultaneously maintaining the current and approved version of the system.

Public Affairs System will maximize the utilization of commercial-off-the-shelf devices and software to provide best overall performance solutions to the warfighter with minimal developmental cost and schedule investments.

MISO will complete a production design of the FABS, validate production requirements, manage FABS technical risk and define system support requirements in FY18, leading to a MS B decision in Q2 FY18, MS C / LRIP decision in Q1 FY20, and an FRP decision in Q4 FY20.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3772 / *Information Related Capabilities (IRC)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MISO	WR	JHU-APL : Laurel, MD	0.000	0.000		1.080	Apr 2019	2.062	Apr 2020	-		2.062	Continuing	Continuing	Continuing
PAS	WR	SSC-PAC : San Diego, CA	0.000	0.000		0.092	Mar 2019	0.390	Mar 2020	-		0.390	Continuing	Continuing	Continuing
MARCIMS	WR	NSWC-IH : Indian Head, MD	0.000	0.000		0.000		0.439	Nov 2019	-		0.439	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		1.172		2.891		-		2.891	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MISO	WR	NAVSEA : Laurel MD	0.000	0.000		3.016	Feb 2019	1.900	Feb 2020	-		1.900	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		3.016		1.900		-		1.900	Continuing	Continuing	N/A

Remarks

MISO includes procurement of 3 test assets and test and evaluation support in FY19.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		4.188		4.791		-		4.791	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3772 / *Information Related Capabilities (IRC)*

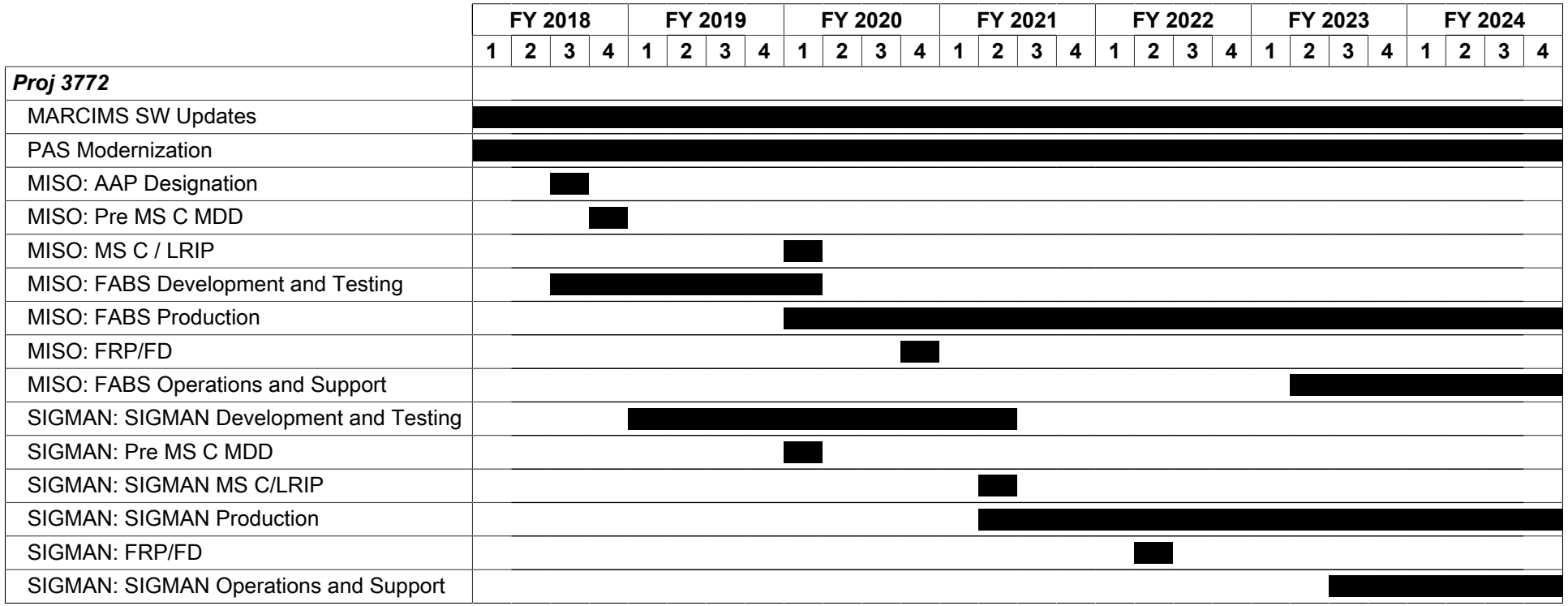

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3772 / *Information Related Capabilities (IRC)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3772				
MARCIMS SW Updates	1	2018	4	2024
PAS Modernization	1	2018	4	2024
MISO: AAP Designation	3	2018	3	2018
MISO: Pre MS C MDD	4	2018	4	2018
MISO: MS C / LRIP	1	2020	1	2020
MISO: FABS Development and Testing	3	2018	1	2020
MISO: FABS Production	1	2020	4	2024
MISO: FRP/FD	4	2020	4	2020
MISO: FABS Operations and Support	2	2023	4	2024
SIGMAN: SIGMAN Development and Testing	1	2019	2	2021
SIGMAN: Pre MS C MDD	1	2020	1	2020
SIGMAN: SIGMAN MS C/LRIP	2	2021	2	2021
SIGMAN: SIGMAN Production	2	2021	4	2024
SIGMAN: FRP/FD	2	2022	2	2022
SIGMAN: SIGMAN Operations and Support	3	2023	4	2024

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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3773: *Fire Coordination and Sensors*	0.000	0.000	7.910	7.801	-	7.801	7.989	8.155	8.321	8.487	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, AFATDS, THS, and FTAS funding has been realigned from Projects 2270, Exp Indirect Fire Gen Supt Wpn Sys and 3099, Radar System, to support USMC Program Management Office (PMO) reorganization.

A. Mission Description and Budget Item Justification

Project 3773 funds the development of Fire Support Coordination Systems and Sensors. These systems digitally connect forward observers and sensors to artillery weapons. The also provide digital tools to develop fire support missions and coordination ground and fire support.

Advanced Field Artillery Tactical Data Family of Systems (AFATDS FoS) - AFATDS FoS consists of three programs, AFATDS, Back Up Computer System (BUCS) and Mobile Tactical Shelter (MTS). The AFATDS automates the fire planning, tactical fire direction, and fire support coordination required to support maneuver from the sea and subsequent operations ashore. AFATDS integrates all supporting arms assets within the Marine Air Ground Task Force (MAGTF) such as mortars, cannon artillery, rockets and missiles, close air support, and naval surface fire support systems. BUCS is a hand-held computer system designed to provide a backup to the AFATDS in computing ballistic firing solutions, as well as provide survey and Meteorological functions in support of artillery. Additionally BUCS is the primary ballistic firing solution system during Ship To Objective Maneuver (STOM). The MTS is a Lightweight Multi-purpose Shelter mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV) which protects both the AFATDS and the BUCS from the environment. The MTS enables rapid emplacement and displacement of fire support elements and provides communications on the move.

Family of Target Acquisition Systems (FTAS) - The FTAS provides the MAGTF the capability to locate, identify, and attack enemy indirect fire weapons systems and observe and direct friendly artillery fire. The FTAS consists of the AN/TPQ-46 Firefinder Radar, the AN/TPQ-49 Lightweight Counter Mortar Radar, Ground Counter Fire Sensor (GCFS), and the AN/TSQ-267 Target Processing Set. The FTAS is critical in the execution of counterfire and the integration of target acquisition information enabling attack by MAGTF assets. The FTAS also provides artillery firing units the ability to conduct artillery registration and other friendly fire missions. The FTAS encompasses the equipment required to support target acquisition within the target acquisition platoon and is resident in the headquarters battery of each artillery regiment. The program will continue to address system issues that arise due to Diminishing Manufacturing Sources and Material Shortage (DMSMS) items within the FTAS. The USMC assumed the role of Primary Inventory Control Activity (PICA) for the AN/TPQ-49 in FY15 when the Army divested itself from the system. The AN/TPQ-46 is being phased out through FY25 and no RDT&E funds are planned in FY19 and out.

Target Hand-Off System (THS) - The THS addressed a Marine Corps operational requirement for a lightweight, handheld, and accurate target acquisition engagement coordination system. THS provides MAGTF Commanders with the only man-portable target location and video downlink capability that allows Air Officers and Fire Support Coordinators to prosecute identified targets. The THS' advance interoperability capability provides the MAGTF Commander with the only portable target

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acquisition system able to interoperate with all target prosecution platforms available on the battlefield. The THS is designed for the Forward Air Controllers (FACs), Forward Observers (FOs), Fire Support Teams (FSTs), Firepower Control Teams (FCTs), Tactical Air Control Parties (TACPs) and Reconnaissance Teams to quickly acquire targets in day, night and near-all-weather visibility conditions, in order to conduct precise, rapid indirect surface fire support, Naval Surface Fire Support (NSFS) and Close Air Support (CAS).

The overall decrease of $0.109M is principally due to the completion of AFATDS interoperability testing with their systems.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: FTAS: Product Development	0.000	1.246	1.629	0.000	1.629
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiated development of Lightweight Counter Mortar Radar (LCMR) tech refresh system.					
FY 2020 Base Plans: - Continue development of Lightweight Counter Mortar Radar (LCMR) tech refresh system. - Continue development of GCFS replacement systems.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Increase of $0.383M from FY19 to FY20 is due to increased scope of Lightweight Counter Mortar Radar (LCMR) tech refresh system development.					
Title: FTAS: Test and Evalution	0.000	0.380	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: - Completed interoperability testing for the Family of Target Acquisition Systems (FTAS) integration within the Marine Air-Ground Task Force (MAGTF).					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Decrease of $0.380M in FY20 is due to interoperability testing being completed in FY19.					
Title: AFATDS: Software Development and Integration	0.000	4.456	5.013	0.000	5.013
Articles:	-	-	-	-	-
FY 2019 Plans: - Completed testing and evaluation of software version 6.8.1.1 P2. - Continued development of AFATDS software version 7.0. - Initiated development of the next generation Back-Up Computer System (BUCS). - Initiated development of AFATDS software version 6.8.1.2.					
FY 2020 Base Plans: - Continue development of AFATDS software version 7.0. - Continue development of the next generation Back-Up Computer System (BUCS). - Continue development of AFATDS software version 6.8.1.2. - Initiate test and evaluation of software version 7.0. - Initiate the development of AFATDS 7.0.1.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: - Increase of $0.557M from FY19 to FY20 due to initiation of development of AFATDS 7.0.1.					
Title: AFATDS: Test and Evaluation	0.000	0.500	0.100	0.000	0.100
Articles:	-	-	-	-	-
FY 2019 Plans: - Continued interoperability testing for AFATDS 6.8.1.1 P2 and BUCS software between all required Joint C2 and Fires systems.					
FY 2020 Base Plans: - Complete interoperability testing for AFATDS 6.8.1.1 P2 and BUCS software between all required Joint C2 and Fires systems. - Initiate interoperability testing for AFATDS 6.8.1.2 software between all required Joint C2 and Fires systems.					
FY 2020 OCO Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.400M from FY19 to FY20 is due to the completion of interoperability testing for AFATDS 6.8.1.1 P2 and BUCS.					
Title: AFATDS: Management Services ***Articles:*** ***FY 2019 Plans:*** - Continued to provide Engineering Support personnel and travel. ***FY 2020 Base Plans:*** - Continue to provide Engineering Support personnel and travel. ***FY 2020 OCO Plans:*** N/A	0.000 -	0.650 -	0.650 -	0.000 -	0.650 -
Title: THS: Product Development ***Articles:*** ***FY 2019 Plans:*** - Continue development of THS V2 software to integrate digital interoperability with Marine Corps and joint aviation platforms and initiate development of a software modem. ***FY 2020 Base Plans:*** - Completion of software modem and continued development of software to insure digital interoperability with close air support (CAS) platforms. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $.269M is due to completion of software modem development.	0.000 -	0.678 -	0.409 -	0.000 -	0.409 -
Accomplishments/Planned Programs Subtotals	0.000	7.910	7.801	0.000	7.801

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/473300: *Family of Target Acq Systems (FTAS)*	0.000	2.867	2.943	-	2.943	3.002	3.061	3.122	3.184	Continuing	Continuing
• PMC/473301: *Advanced Field Artillery Tactical Data Family of Systems (AFATDS FoS)*	0.000	12.521	12.852	-	12.852	15.531	15.908	16.245	16.570	Continuing	Continuing
• RDTE/0206313M/2270: *Advanced Field Artillery Tactical Data Family of Systems (AFATDS FoS)*	4.558	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.672
• RDTE/3099: *Family of Target Acq Systems (FTAS)*	1.215	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.712
• PMC/463100: *Target Handoff System (THS)*	17.985	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.985
• PMC/47330: *Target Handoff System (THS)*	0.000	23.983	2.439	-	2.439	2.487	2.537	2.588	2.640	Continuing	Continuing
• PMC/4631: *Advanced Field Artillery Tactical Data Family of Systems (AFATDS FoS)*	10.199	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• RDTE/0206313M/227000: *Target Handoff System (THS)*	1.629	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.629
• PMC/465000: *Family of Target Acq Systems (FTAS)*	5.135	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.135

Remarks

D. Acquisition Strategy

Advanced Field Artillery Tactical Data Family of Systems (AFATDS FoS) - AFATDS is managed through Army CECOM, Aberdeen Proving Ground, MD. R&D efforts for the next AFATDS version will be a combined effort between the software developer, the Army PM, and the USMC for software enhancements through DISA. Current software enhancements are performed at Army, Ft. Sill, OK.

Family of Target Acquisition Systems (FTAS) - The Family of Target Acquisition Systems consists of 4 major components: AN/TPQ-46, AN/TPQ-49, Ground Counter Fire Sensor (GCFS), and the AN/TSQ-267. Of these 4 systems, the AN/TPQ-46 is due to be replaced by the Ground/Air Task Oriented Radar (G/ATOR) beginning in 2019. Activities during 2016 and beyond will be limited to maintain the authority to operate (ATO) accreditation. USMC activities on the AN/TPQ-49 are escalating due to the fact the US Army divested from the AN/TPQ-49, the USMC has assumed the responsibilities of the primary inventory control activity (PICA). Program Office

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will conduct an engineering change to the AN/TPQ-49 to provide the operating forces with a mobile, stand-alone configuration. The program office will transition the improved Acoustic Sensor capability from the Science and Technology (S&T) phase into the acquisition cycle and continue development by exploiting recent technology improvements. The improved acoustic sensor will be capable of transmitting digital information via JVMF to AFATDS in support of artillery and counter fire operations. Additionally, the AN/TSQ-267 requires hardware updates in order to continue housing the suite of equipment that supports the Target Processing Center (TPC) activities. GCFS procurement will consist of multiple contract awards with USMC as system integrator.

THS: The acquisition of components (software/hardware) for the THS initiative will maximize the use of existing COTS, Government-Off-The-Shelf (GOTS), Non-Developmental Item (NDI), and Government Furnished Equipment (GFE). Software is transitioning to a government owned baseline. Software must maintain compatibility with five Programs of Record (POR) and seven Operational Flight Programs (OFP). Equipment is purchased from multiple vendors with AMRDEC acting as the lead integrator for the UDMC.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FTAS	C/FFP	AMRDEC : Huntsville, AL	0.000	0.000		1.246	Feb 2019	0.550	Feb 2020	-		0.550	0.000	1.796	-
FTAS	MIPR	TYAD : Tobyhanna, PA	0.000	0.000		0.000		0.300	Nov 2019	-		0.300	0.000	0.300	-
FTAS	WR	NSWC DD : Dahlgren, VA	0.000	0.000		0.000		0.450	Nov 2019	-		0.450	0.000	0.450	-
FTAS	C/CPFF	SSC LANT : Charleston, SC	0.000	0.000		0.000		0.329	Feb 2020	-		0.329	0.000	0.329	-
THS	MIPR	Army : Huntsville, AL	0.000	0.000		0.678	Jan 2019	0.409	Jan 2020	-		0.409	Continuing	Continuing	Continuing
AFATDS	MIPR	DISA : Belleville, IL	0.000	0.000		4.456	Feb 2019	2.547	Feb 2020	-		2.547	0.000	7.003	-
AFATDS	MIPR	FSED : Ft. Sill, OK	0.000	0.000		0.000		1.800	Jan 2020	-		1.800	0.000	1.800	-
AFATDS	MIPR	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		0.000		0.305	Mar 2020	-		0.305	0.000	0.305	-
AFATDS	C/FFP	CECOM/MITRE : Ft. Monmouth, NJ	0.000	0.000		0.000		0.361	Dec 2019	-		0.361	0.000	0.361	-
		Subtotal	0.000	0.000		6.380		7.051		-		7.051	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FTAS	WR	MCTSSA : Camp Pendleton, CA	0.000	0.000		0.380	Feb 2019	0.000		-		0.000	0.000	0.380	-
AFATDS	C/FFP	MCTSSA : Camp Pendleton, CA	0.000	0.000		0.500	Feb 2019	0.100	Feb 2020	-		0.100	0.000	0.600	-
		Subtotal	0.000	0.000		0.880		0.100		-		0.100	0.000	0.980	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AFATDS	C/CPFF	CECOM/MITRE : Ft. Monmouth, NJ	0.000	0.000		0.650	Nov 2018	0.650	Dec 2019	-		0.650	0.000	1.300	-
		Subtotal	0.000	0.000		0.650		0.650		-		0.650	0.000	1.300	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		7.910		7.801		-		7.801	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3773 / *Fire Coordination and Sensors*

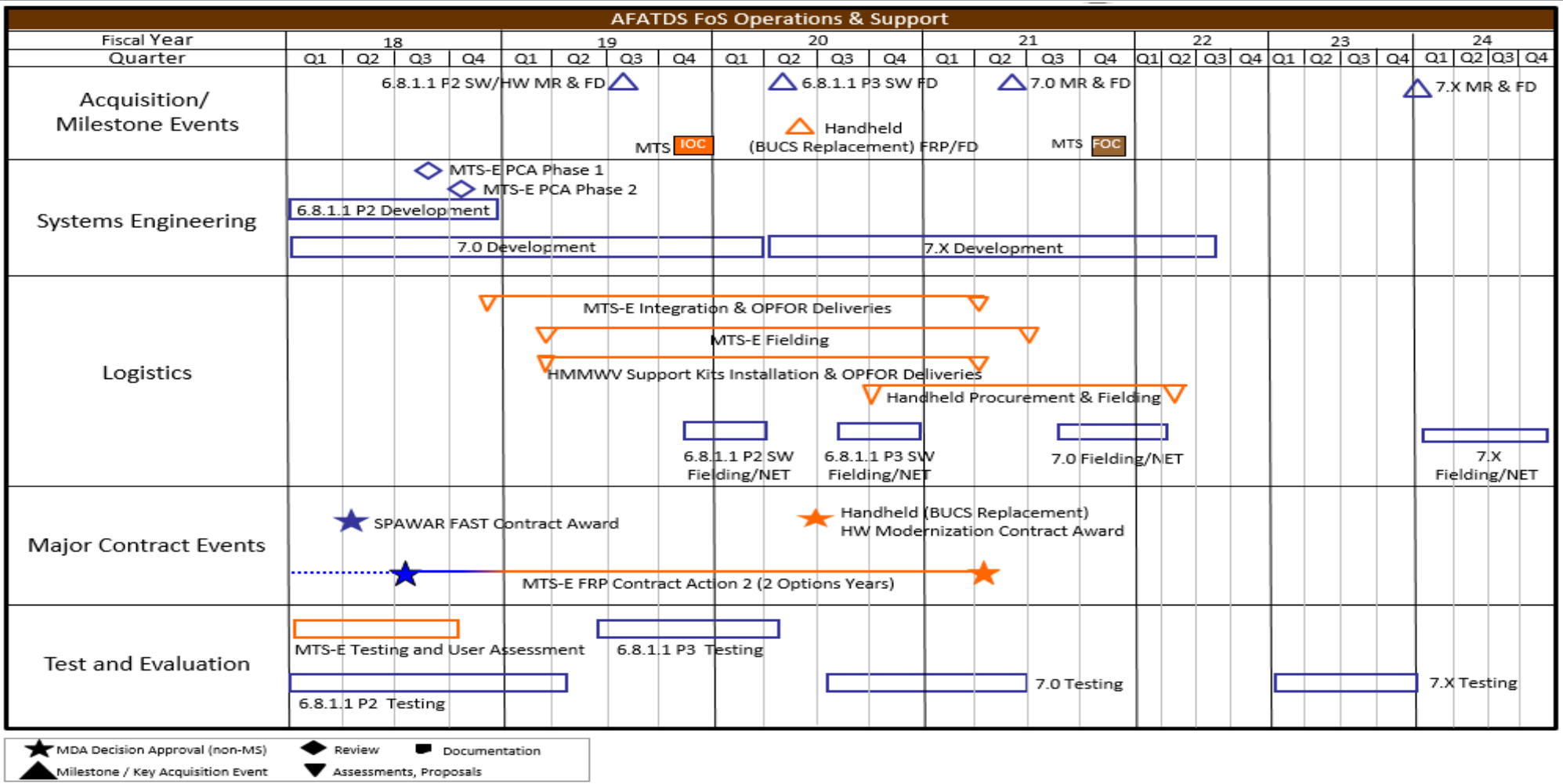

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 3773 / *Fire Coordination and Sensors*

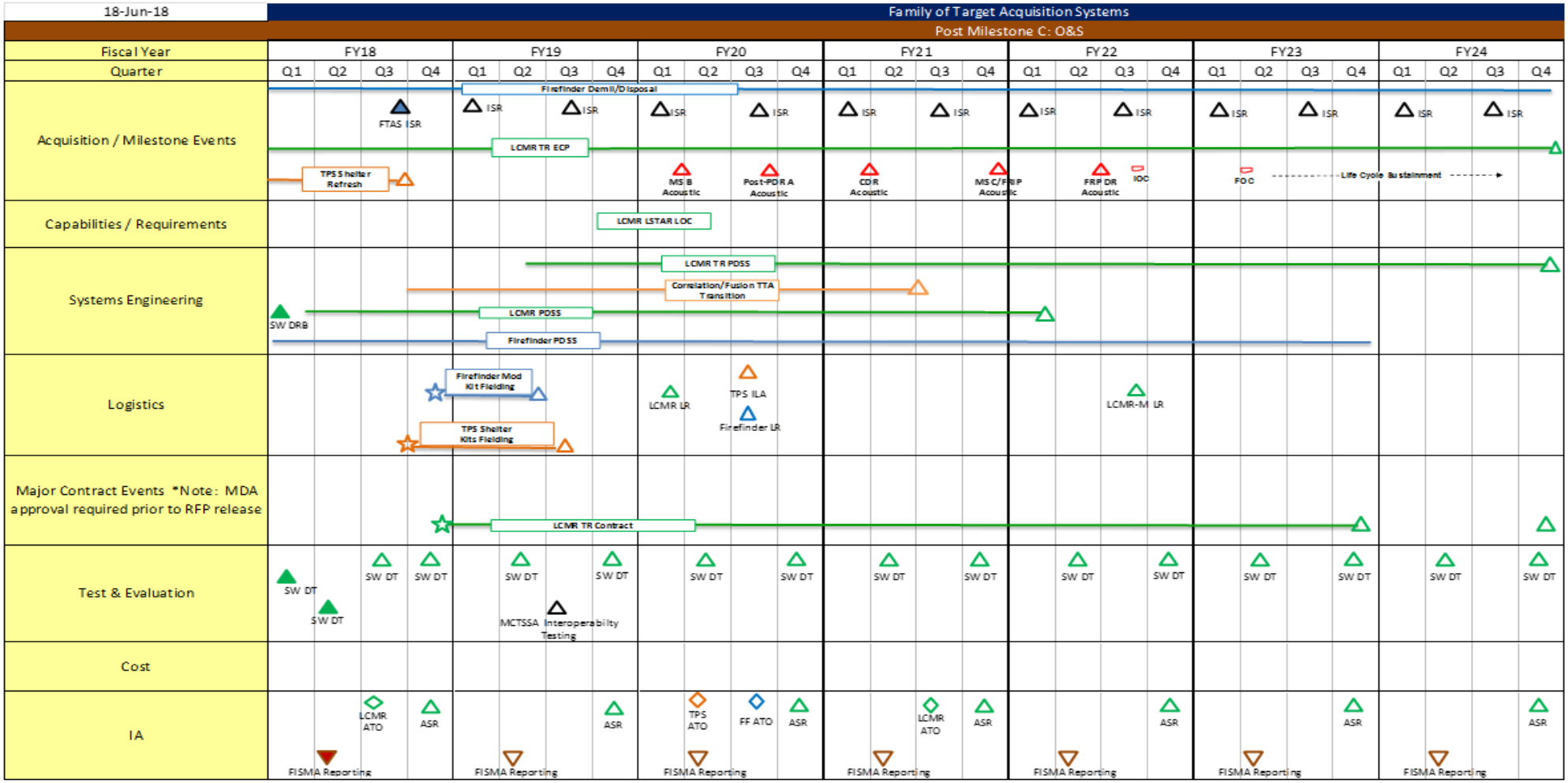

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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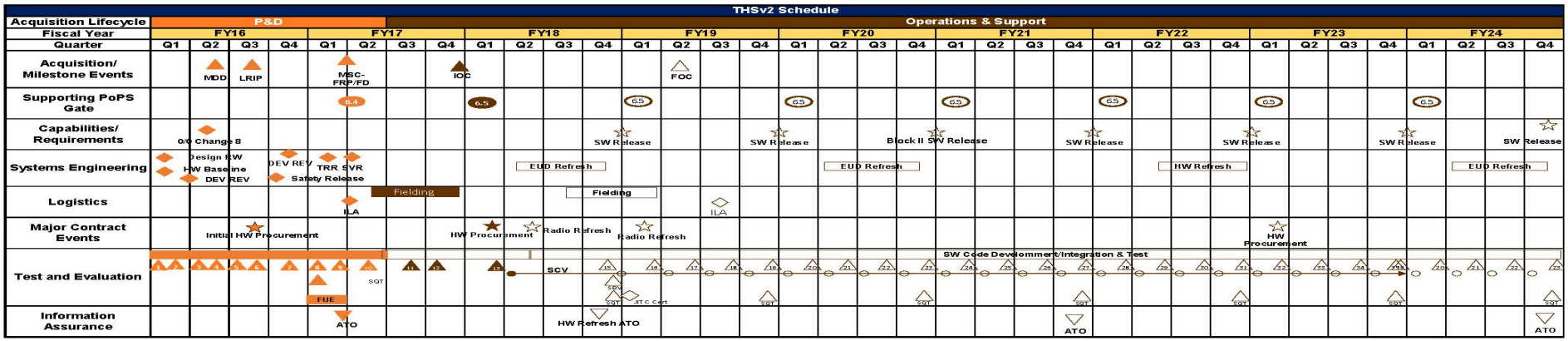

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3773				
AFATDS 7.0 Software Development	1	2018	2	2020
AFATDS 7.0 Testing	3	2020	3	2021
FTAS - Data Fusion Tech Transition	3	2021	3	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	29.961	51.959	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	81.920
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Long Range Radar (AN/TPS-59) $12.554M - The AN/TPS-59A(V)3 is a transportable, three dimensional, tactical radar system that provides the Marine Air Ground Task Force (MAGTF) with long-range surveillance. It is the MAGTF's only ground based long range sensor that provides the capability to detect and report Air Breathing Targets (ABT) and track Theater Ballistic Missiles (TBM). The AN/TPS-59A(V)3 Radar System is connected to the Common Aviation Command and Control Systems (CAC2S). It provides the air defense controllers data and may be used autonomously to conduct ground control intercept, tactical en-route Air Traffic Control (ATC), or TBM alert operations via the joint Integrated Air Missile Defense (IAMD) encrypted Link-16. The USMC extended the AN/TPS-59 service life through 2035, therefore, in order to maintain operational relevance on the battlefield, a number of modernization efforts are being initiated. The Digital Receiver and Exciter (DREX) upgrade will convert the analog receivers and exciters to digital to address Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues, enable spectral agility, reduce noise, reduce false alarms, and enhance electronic counter-countermeasures (ECCM) capability. This effort will include an essential simulation and test environment capability.

Ground Based Air Defense- Future Weapons Systems (GBAD FWS) $39.405M- In response to urgent warfighting requirements for counter unmanned aircraft system (C-UAS) capability, the Marine Corps has developed and delivered multiple C-UAS systems supporting both conventional and special operations Marine Corps forces. The Marine Corps will transition to a new Ground based Air Defense (GBAD) Program of Record called the Marine Air Defense Integrated System (MADIS) with an Initial Operational Capability of FY21. The MADIS, which will be based on the Joint Light Tactical Vehicle (JLTV) relies on technological and integration advancements of near-term C-UAS efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Radar System Development	12.554	0.000
FY 2018 Accomplishments: -Initiated RES EDM Development and Production. -Initiated DREX Software Development and Test Environment -Initiated DREX DT 1 -Continued MITRE Engineering Support -Continue DREX Program Support ***FY 2019 Plans:*** N/A		
Congressional Add: FOB Protection - Counter-UAS	39.405	0.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
FY 2018 Accomplishments: -Congressional Add funding purchased and integrated Counter-UAS Prototype Components for testing, assessing, and deploying the following platforms; the Expeditionary-Marine Air Defense Integrated System (E-MADIS), MADIS Inc 0.1-MATV and MADIS Inc 1 - JLTV in support of UUNS #15205UA, JUONS #CC-0558 and JEONS #ST-0008. Additionally, these efforts mitigate risk for the successful development and fielding of the various MADIS platforms. ***FY 2019 Plans:*** N/A		
Congressional Adds Subtotals	51.959	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4650: *AN/TPS-59 Mods*	9.676	6.694	0.329	-	0.329	5.315	6.469	8.142	0.000	Continuing	Continuing
• RDTE/0206313M/3099: *AN/TPS-59 Mods*	5.071	15.307	12.317	-	12.317	4.218	0.000	0.000	0.000	Continuing	Continuing
• PMC/3006: *GBAD*	10.026	18.334	175.998	-	175.998	267.976	238.980	233.442	238.127	21.675	1,316.775
• RDTEN/0206313M/2278: *GBAD*	28.794	89.735	49.535	15.000	64.535	21.523	12.351	26.052	26.570	Continuing	Continuing

Remarks

D. Acquisition Strategy

Long Range Radar (AN/TPS-59) - Due to the proprietary nature of the software, the AN/TPS-59 Program will utilize a sole source contract with the OEM for software and Digital Receiver and Exciter (DREX) development. The AN/TPS-59 program will utilize full and open competition to the max extent possible on areas that do not have proprietary restrictions.

Ground Based Air Defense- Future Weapons Systems (GBAD FWS)-The GBAD FWS capability will be developed in three increments. Increment 1 modernizes the existing GBAD legacy systems (A-MANPADS) by mounting a mix of legacy and technologically mature capabilities (from UUNS achievements) onto Joint Light Tactical Vehicles (JLTV), mitigating the risk of attacks from UAS and FW/RW aircraft, while maintaining pace with maneuver forces. Increment 2 focuses on significant extended range to the Increment 1 system as well as kinetic and non kinetic capabilities. Increment 3 will be a new system designed to defend fixed/semi-fixed assets against Cruise Missiles (CM) and Rockets, Artillery, and Mortars (RAM) threats. GBAD FWS Increment 1 is called Marine Air Defense Integrated System (MADIS) which has been designated an ACAT II program. MADIS entered development phase mid FY18 and culminates development with Milestone C 1QFY20. Initial MADIS integration and development will be accomplished by Naval Surface Warfare Centers Crane and Dahlgren. An IOC of 4QFY21 and FOC of 4QFY25 have been established. To support a Material Support Decision, a concept demonstration of a CM defense system has been planned for 4QFY19. Initial design and integration reviews for this

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Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 9999 / *Congressional Adds*

CM system are underway at this time. A 4QFY19 Accelerated Acquisition decision from Deputy Assistant Secretary of the Navy (DASN) Expeditionary & Logistics Management (E&LM) is planned to place Inc 3 Medium Range Intercept under the Middle Tier Acquisition guidelines.

E. Performance Metrics

Milestone Reviews
OSD Financial Benchmarks
Integrated Master Schedule
Technical Performance Measures

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 DREX RES EDM Production and Development	SS/CPFF	LMC : Syracuse, NY	0.000	5.561	Aug 2018	0.000		0.000		-		0.000	0.000	5.561	-
GBAD FWS-GFE	MIPR	DLA : Philadelphia, PA	0.000	23.109	Jul 2018	0.000		0.000		-		0.000	0.000	23.109	-
GBAD FWS-GFE	MIPR	PD CRAM : Redstone Arsenal	0.000	12.892	Jul 2018	0.000		0.000		-		0.000	0.000	12.892	-
GBAD FWS Integration	MIPR	NSWC : Crane/SAIC	0.000	1.181	Oct 2018	0.000		0.000		-		0.000	0.000	1.181	-
Prior Year Cumulative Funding	Various	Various : Various	13.184	0.000		0.000		0.000		-		0.000	0.000	13.184	-
		Subtotal	13.184	42.743		0.000		0.000		-		0.000	0.000	55.927	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 Program Support	C/FFP	AI : Stafford, VA	0.000	0.227	Nov 2018	0.000		0.000		-		0.000	0.000	0.227	-
GBAD FWS C2 Support	MIPR	PD CRAM : Redstone Arsenal	0.000	0.999	Oct 2018	0.000		0.000		-		0.000	0.000	0.999	-
GBAD FWS Eng Support	MIPR	NSWC : Crane/ SAIC	0.000	1.224	Jul 2018	0.000		0.000		-		0.000	0.000	1.224	-
Prior Year Cumulative Funding	Various	Various : Various	8.768	0.000		0.000		0.000		-		0.000	0.000	8.768	-
		Subtotal	8.768	2.450		0.000		0.000		-		0.000	0.000	11.218	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 DREX DT1	SS/CPFF	LMC : Syracuse, NY	0.000	2.001	Aug 2018	0.000		0.000		-		0.000	0.000	2.001	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 9999 / *Congressional Adds*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 DREX SW Development and Test Environment	SS/CPFF	LMC : Syracuse, NY	0.000	2.913	Aug 2018	0.000		0.000		-		0.000	0.000	2.913	-
Prior Year Cumulative Funding	Various	Various : Various	3.713	0.000		0.000		0.000		-		0.000	0.000	3.713	-
		Subtotal	3.713	4.914		0.000		0.000		-		0.000	0.000	8.627	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/TPS-59 Engineering Support	SS/FFP	MITRE : Bedford, MA	4.296	1.852	Sep 2018	0.000		0.000		-		0.000	0.000	6.148	-
		Subtotal	4.296	1.852		0.000		0.000		-		0.000	0.000	6.148	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	29.961	51.959		0.000		0.000		-		0.000	0.000	81.920	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 9999 / *Congressional Adds*

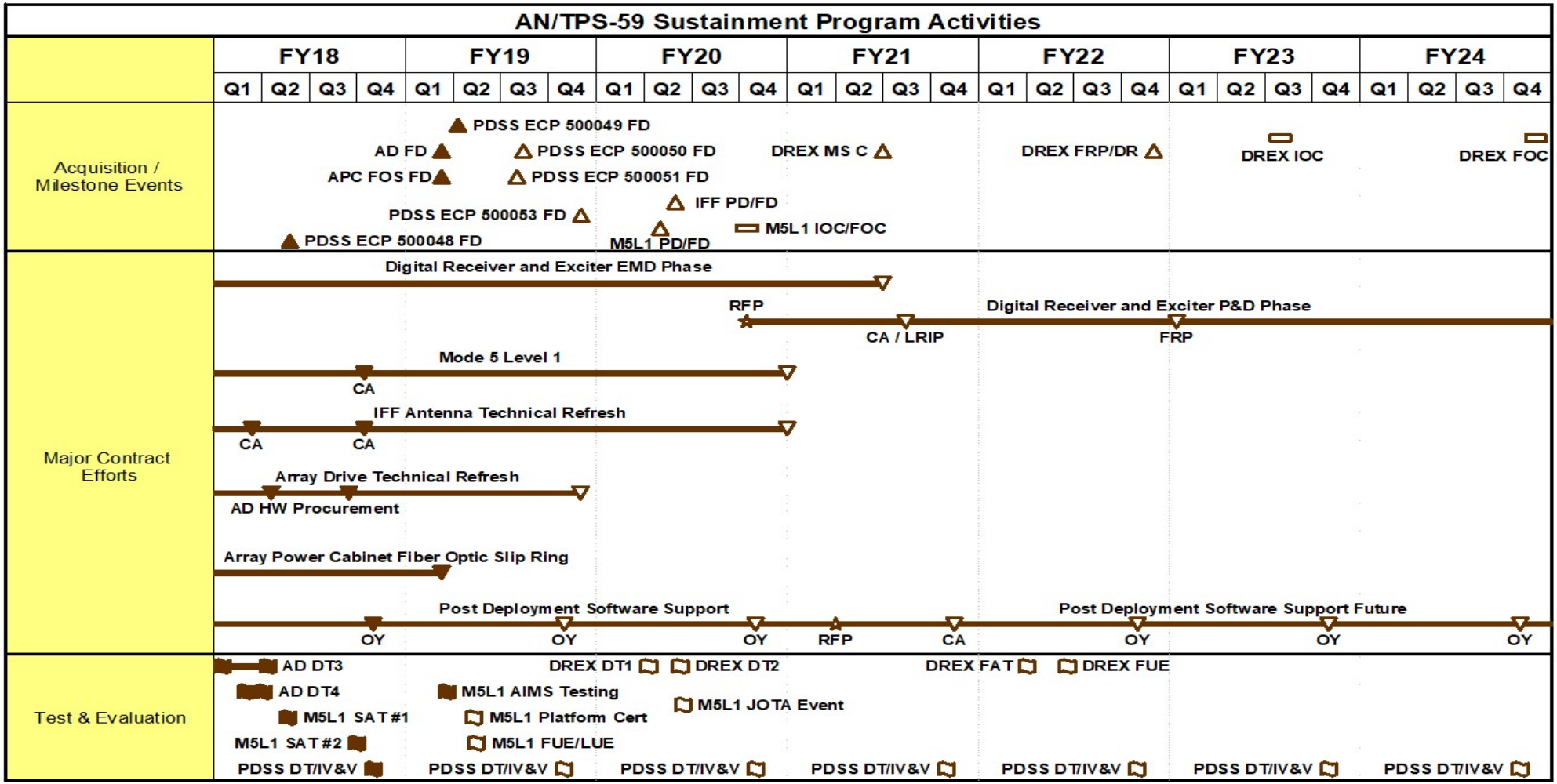

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 9999 / *Congressional Adds*

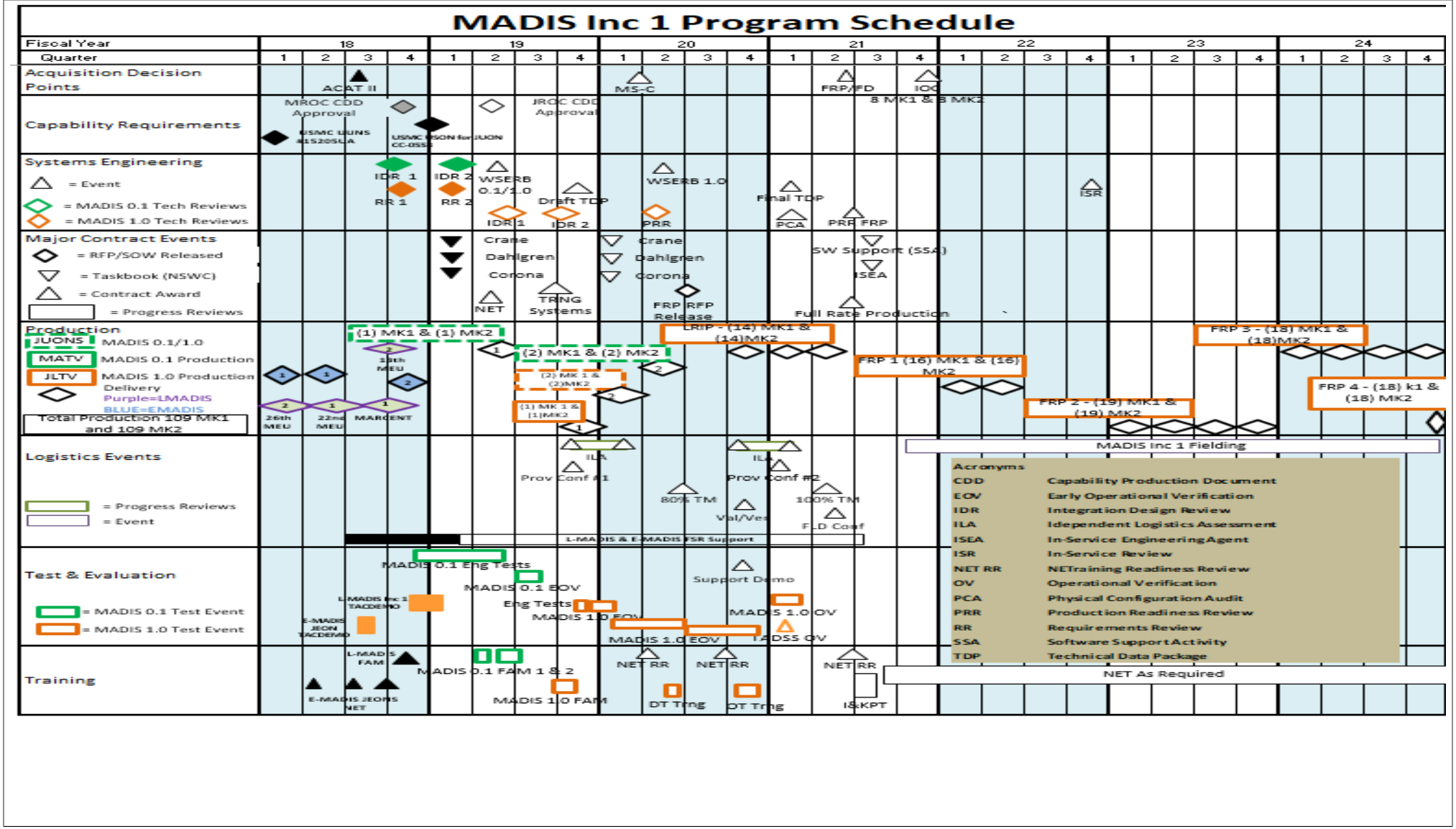

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206313M / *Marine Corps Comms Systems*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Radar System Development				
AN/TPS-59 Array Drive (AD) Fielding Decision (FD)	1	2019	1	2019
AN/TPS-59 PDSS ECP FD	3	2019	3	2019
AN/TPS-59 MS C	3	2021	3	2021
FOB Protection- Counter-UAS				
Production/Integration: E-MADIS Integration	3	2018	2	2020
Production/Integration: MADIS Inc 0 Integration	4	2018	1	2020
Test & Evaluation: JUON T&E	4	2018	4	2020
Training: JUON Training	4	2018	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0206335M *I (U)Common Aviation Command and Control Sys (CAC2S)*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	52.461	6.976	4.760	4.489	-	4.489	4.346	4.435	4.530	4.620	Continuing	Continuing
3373: *Common Aviation Command and Control System (CAC2S)*	52.461	6.976	4.760	4.489	-	4.489	4.346	4.435	4.530	4.620	Continuing	Continuing

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): MN36

A. Mission Description and Budget Item Justification

Common Aviation Command and Control System (CAC2S) - A coordinated modernization effort to replace the existing aviation command and control equipment of the Marine Air Command and Control System (MACCS) and to provide the Aviation Combat Element (ACE) with the necessary hardware, software, equipment, and facilities to effectively command, control, and coordinate aviation operations. The CAC2S system will accomplish the MACCS missions with a suite of operationally scalable modules to support the Marine Air Ground Task Force (MAGTF), Joint, and Coalition Forces. The CAC2S integrates the functions of aviation command and control into an interoperable system that will support the core competencies of all Marine Corps warfighting concepts. The CAC2S, in conjunction with the MACCS organic sensors (AN/TPS-63, AN/TPS-59, and AN/TPS-80 (Ground/Air Task Oriented Radar (G/ATOR)) and weapon system Composite Tracking Network (CTN) will provide enhanced air control, improved situational awareness, sensor integration (G/ATOR and AN/TPS-59), full Tactical Data Link integration, airspace and battle planning and command functionality as well as sensor netting integration (CTN). CAC2S, with these organic MACCS programs, support the tenets of Expeditionary Maneuver Warfare and fosters joint interoperability. CAC2S Increment I will replace legacy aviation command and control systems in the following Marine aviation agencies: Direct Air Support Center (DASC), Tactical Air Command Center (TACC), and Tactical Air Operations Center (TAOC).

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	7.343	4.826	4.506	-	4.506
Current President's Budget	6.976	4.760	4.489	-	4.489
Total Adjustments	-0.367	-0.066	-0.017	-	-0.017
• Congressional General Reductions	-	-0.066			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.124	0.000			
• SBIR/STTR Transfer	-0.243	0.000			
• Rate/Misc Adjustments	0.000	0.000	-0.017	-	-0.017

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0206335M *I (U)Common Aviation Command and Control Sys (CAC2S)*

Change Summary Explanation

Funding decrease of $0.271M from FY 2019 to FY 2020 due to the completion of CAC2S FOT&E.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*				Project (Number/Name) 3373 / *Common Aviation Command and Control System (CAC2S)*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3373: *Common Aviation Command and Control System (CAC2S)*	52.461	6.976	4.760	4.489	-	4.489	4.346	4.435	4.530	4.620	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: MN36

Note

Prior year funding is listed in PE 0206313M Marine Corps Comms Systems, Project 2273 Air Operations Command & Control (C2) Systems.

A. Mission Description and Budget Item Justification

Common Aviation Command and Control System (CAC2S) - A coordinated modernization effort to replace the existing aviation command and control equipment of the Marine Air Command and Control System (MACCS) and to provide the Aviation Combat Element (ACE) with the necessary hardware, software, equipment, and facilities to effectively command, control, and coordinate aviation operations. The CAC2S system will accomplish the MACCS missions with a suite of operationally scalable modules to support the Marine Air Ground Task Force (MAGTF), Joint, and Coalition Forces. The CAC2S integrates the functions of aviation command and control into an interoperable system that will support the core competencies of all Marine Corps warfighting concepts. The CAC2S, in conjunction with the MACCS organic sensors (AN/TPS-63, AN/TPS-59, and AN/TPS-80 (Ground/Air Task Oriented Radar (G/ATOR)) and weapon system Composite Tracking Network (CTN) will provide enhanced air control, improved situational awareness, sensor integration (G/ATOR and AN/TPS-59), full Tactical Data Link integration, airspace and battle planning and command functionality as well as sensor netting integration (CTN). CAC2S, with these organic MACCS programs, support the tenets of Expeditionary Maneuver Warfare and fosters joint interoperability. CAC2S Increment I will replace legacy aviation command and control systems in the following Marine aviation agencies: Direct Air Support Center (DASC), Tactical Air Command Center (TACC), and Tactical Air Operations Center (TAOC).
Funding decrease of $0.271M from FY 2019 to FY 2020 due to the completion of CAC2S FOT&E.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	1.063	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*	**Project (Number/Name)** 3373 / *Common Aviation Command and Control System (CAC2S)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A					
Title: Support and Management Services	1.851	1.033	1.008	0.000	1.008
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue yearly Cyber Compliance Tests required with each of the CAC2S quarterly software releases and conduct the Annual Security Review testing to support the maintenance of the CAC2S Authority to Operate (ATO). - Continue MITRE support during G/ATOR DT-1E, IOT&E, and CAC2S Phase 2 FOT&E test events. ***FY 2020 Base Plans:*** - Continue to conduct yearly Cyber Compliance Tests required with each of the CAC2S quarterly software releases and conduct the Annual Security Review testing to support the maintenance of the CAC2S Authority To Operate (ATO)/ Authority To Connect (ATC) reaccreditation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.025M from FY 2019 to FY 2020 is due to reduction of scope of activity support due to completion of FY 2019 test events.					
Title: Test and Evaluation	4.062	3.727	3.481	0.000	3.481
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue interface test support during G/ATOR DT-1E and IOT&E as well as CAC2S Phase 2 FOT&E to validate G/ATOR interface. - Initiate integration and test of AN/MRQ-13 Communication Subsystem (CS) hardware procured for tech refresh to ensure operational readiness and compatibility with system baseline prior to fielding. ***FY 2020 Base Plans:*** - Continue required integration and interface testing of upgraded hardware components and software enhancements to support ATO/ATC reaccreditation. - Initiate testing to support system software capability enhancements (Multi Source Correlator Tracker (MSCT), virtual Air Defense Systems Integrator (vADSI), Flexible Analysis and Mission Effectiveness System (FLAMES),					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*	**Project (Number/Name)** 3373 / *Common Aviation Command and Control System (CAC2S)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FLAMES Automated Simulation Trainer (FAST)) in improve capability and maintain system Authority To Operate (ATO)/ Authority To Connect (ATC) reaccreditation by Q2 FY 2021. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.246M from FY 2019 to FY 2020 is due to reduction of scope of activity support due to completion of interface support provided during G/ATOR FY 2019 test events and CAC2S FOT&E.					
Accomplishments/Planned Programs Subtotals	6.976	4.760	4.489	0.000	4.489

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4644: *Common Aviation Command And Control System (CAC2S)*	48.295	32.587	37.203	-	37.203	33.051	3.970	4.065	4.261	0.000	244.803

Remarks

RDT&E prior to FY15 is listed in PE 0206313M Marine Corps Comms Systems, Project 2273 Air Operations Command & Control (C2) Systems.

PMC funding for FY15 and beyond is listed in BLI 4644 Common Aviation Command and Control System (CAC2S). Prior to FY15 PMC funding is listed in BLI 4640 Air Operations C2 Systems, Common Aviation Command and Control Systems (CAC2S).

D. Acquisition Strategy

CAC2S will employ an evolutionary acquisition strategy utilizing an incremental and phased approach for development and fielding of the CAC2S. The Capability Production Document (CPD) identifies two increments to achieve the full requirements of CAC2S. The current acquisition strategy addresses Increment I of the CAC2S development process and focuses on the requirements that will modernize the assault and air support, air defense and control, and Aviation Combat Element (ACE) battle management capabilities of the Marine Air Command and Control System (MACCS). Increment I of the CAC2S will be accomplished through a two phased approach. Phase 1 addressed the requirements to establish the baseline CAC2S capabilities for the MACCS and improved Air Command and Control (AC2) performance and effectiveness. Phase 2 will address the requirements for remaining ACE Battle Management Command & Control (BMC2) requirements. Quantity nine (9) Phase 2 Limited Deployment Unit systems were procured in FY15 and FY16 and fielded in FY17. Full Deployment Unit (FDU) production contract awarded 24 August 2017 and will provide a total of forty one (41) systems to be fielded over three years (FY 2018-FY 2020). Approved Acquisition Objective is 50 systems.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*	**Project (Number/Name)** 3373 / *Common Aviation Command and Control System (CAC2S)*

E. Performance Metrics

Integrated Master Schedule
OSD Financial Benchmarks
Technical Performance Measures
Probability of Program Success (PoPS) Assessments

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*	**Project (Number/Name)** 3373 / *Common Aviation Command and Control System (CAC2S)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Development	WR	NSWC CD : Crane, IN	2.042	0.264	Nov 2017	0.000		0.000		-		0.000	0.896	3.202	-
Engineering Manufacturing and Development	C/FPIF	General Dynamics : Pheonix, AZ	3.800	0.000		0.000		0.000		-		0.000	16.544	20.344	59.922
Software Development	WR	NSWC DD : Dahlgren, VA	2.905	0.799	Nov 2017	0.000		0.000		-		0.000	0.000	3.704	-
Hardware and Software Engineering	C/CPIF	NSWC CD : Crane, IN	1.197	0.000		0.000		0.000		-		0.000	0.000	1.197	-
		Subtotal	9.944	1.063		0.000		0.000		-		0.000	17.440	28.447	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Various	Travel : TBD	0.215	0.050	Oct 2017	0.039	Oct 2018	0.045	Oct 2019	-		0.045	Continuing	Continuing	Continuing
Engineering Support	WR	NSWC DD : Dahlgren, VA	1.563	0.908	Nov 2017	0.233	Nov 2018	0.292	Nov 2019	-		0.292	0.000	2.996	-
Acquisition Support	WR	NSWC CD : Crane, IN	0.199	0.372	Nov 2017	0.241	Nov 2018	0.311	Nov 2019	-		0.311	0.000	1.123	-
Software Support	C/FFP	Raytheon Solipsys : Fulton, MD	0.000	0.000		0.000		0.180	Aug 2020	-		0.180	0.000	0.180	-
Software Support	C/FFP	Ternion : Huntsville, AL	0.000	0.000		0.000		0.180	May 2020	-		0.180	0.000	0.180	-
Prior Years Cumulative Funding	Various	Various : Various	4.121	0.000		0.000		0.000		-		0.000	0.000	4.121	-
		Subtotal	6.098	1.330		0.513		1.008		-		1.008	Continuing	Continuing	N/A

Remarks

$0.495M increase From FY 2019 to FY 2020 is due to increase in support for CAC2S SW enhancements (Multi Source Correlator Tracker (MSCT), virtual Air Defense Systems Integrator (vADSI), Flexible Analysis and Mission Effectiveness System (FLAMES), FLAMES Automated Simulation Trainer (FAST)) associated with Authority To Operate (ATO)/ Authority To Connect (ATC) reaccreditation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*	**Project (Number/Name)** 3373 / *Common Aviation Command and Control System (CAC2S)*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing and Evaluation	WR	NSWC - Port Huenueme : Port Huenueme, CA	2.309	0.623	Nov 2017	0.442	Nov 2018	0.000		-		0.000	0.955	4.329	-
Testing and Evaluation	Sub Allot	MCOTEA : Quantico, VA	3.038	0.000		0.000		0.000		-		0.000	3.465	6.503	-
Testing and Evaluation	Sub Allot	MCTSSA : Camp Pendleton, CA	7.254	0.250	Nov 2017	0.118	Nov 2018	0.000		-		0.000	0.952	8.574	-
Testing and Evaluation	WR	NSWC CD : Crane, IN	7.403	0.907	Nov 2017	0.878	Nov 2018	2.528	Nov 2019	-		2.528	7.445	19.161	-
Testing and Evaluation	WR	NSWC DD : Dahlgren, VA	2.486	2.282	Nov 2017	2.289	Nov 2018	0.435	Nov 2019	-		0.435	0.000	7.492	-
Testing and Evaluation	WR	NSWC Corona : Corona, CA	0.000	0.000		0.000		0.518	Nov 2019	-		0.518	0.000	0.518	-
Prior Years Cumulative Funding	Various	Various : Various	8.624	0.000		0.000		0.000		-		0.000	0.000	8.624	-
		Subtotal	31.114	4.062		3.727		3.481		-		3.481	12.817	55.201	N/A

Remarks

NSWC Crane $1.650M increase from FY 2019 to FY 2020 is due to integration and interface testing upgraded HW components and SW enhancements for ATO/ATC reaccreditation. NSWC Dahlgren is reduced by -$1.854M from FY 2019 to FY 2020 due to reduction in scope of required T&E support.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	2.732	0.000		0.000		0.000		-		0.000	0.000	2.732	19,096.227
Sensor Management	C/FFP	MITRE : Bedford, MA	2.573	0.521	Oct 2017	0.520	Oct 2018	0.000		-		0.000	2.958	6.572	-
		Subtotal	5.305	0.521		0.520		0.000		-		0.000	2.958	9.304	N/A

Remarks

-$0.520M decrease from FY 2019 to FY 2020 is due to not requiring MITRE support in FY 2020.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*	Project (Number/Name) 3373 / *Common Aviation Command and Control System (CAC2S)*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	52.461	6.976		4.760		4.489		-		4.489	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*	**Project (Number/Name)** 3373 / *Common Aviation Command and Control System (CAC2S)*

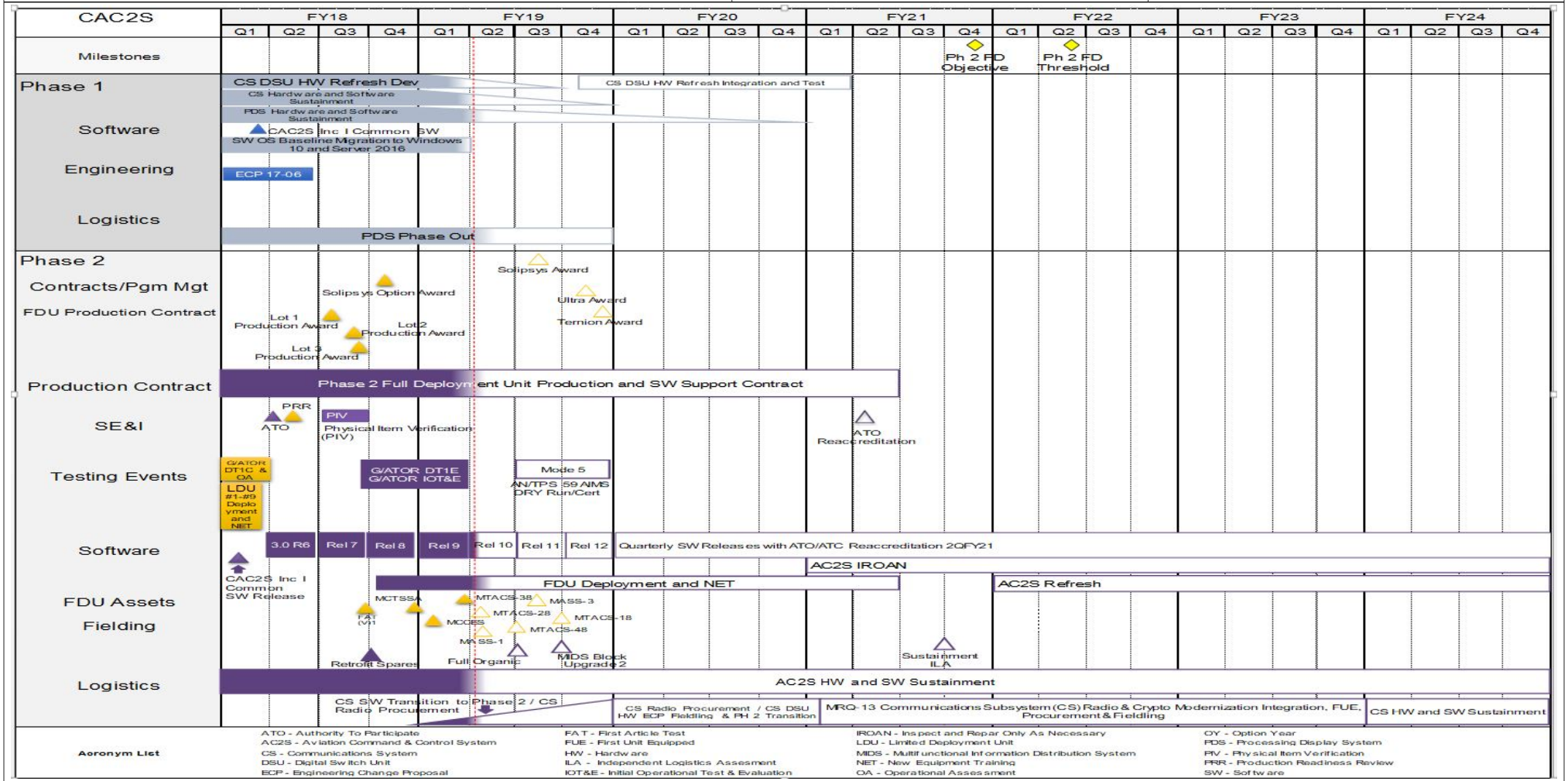

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206335M / *(U)Common Aviation Command and Control Sys (CAC2S)*	**Project (Number/Name)** 3373 / *Common Aviation Command and Control System (CAC2S)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3373				
CAC2S RDT&E IMS: Communication Subsystem (CS) Hardware Integration and Test	4	2019	1	2021
CAC2S RDT&E IMS: CAC2S Phase 2 FOT&E	3	2018	1	2019
CAC2S RDT&E IMS: G/ATOR Initial Operational Test & Evaluation	3	2018	1	2019
CAC2S RDT&E IMS: G/ATOR Developmental Test - 1E	3	2018	1	2019
CAC2S RDT&E IMS: SW Enhancements for ATO/ATC reaccreditation	1	2020	2	2021
CAC2S RDT&E IMS: Quarterly SW release 13 - 16	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0206623M *I MC Ground Cmbt Spt Arms Sys*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	615.156	68.941	100.850	51.788	-	51.788	66.030	74.485	73.391	74.845	Continuing	Continuing
1555: *Lt Armored Vehicle Prog*	125.847	12.393	0.000	1.231	-	1.231	5.694	3.160	3.224	3.288	Continuing	Continuing
1557: *Next Gen Armored Reconnaissance Vehicle (LAV replacement)*	0.000	0.000	1.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.500
1901: *MC Grnd Wpnry Prod Improvement*	40.797	3.217	19.589	7.607	-	7.607	5.469	5.181	5.279	5.384	Continuing	Continuing
2086: *Soldier/Marine Enhancement*	32.915	3.418	3.353	2.539	-	2.539	4.037	3.886	3.516	3.586	Continuing	Continuing
2112: *Lightweight 155mm Howitzer*	4.969	0.000	1.800	2.000	-	2.000	0.000	2.000	0.000	0.000	0.000	10.769
2237: *Amphibious Vehicle Test*	10.323	4.372	2.297	2.820	-	2.820	2.886	2.947	3.007	3.067	Continuing	Continuing
2315: *Training Devices/ Simulators*	135.514	22.979	16.060	11.561	-	11.561	24.815	23.179	19.674	20.067	Continuing	Continuing
2503: *Initial Issue*	48.877	4.291	5.412	5.498	-	5.498	5.756	5.845	5.938	6.055	Continuing	Continuing
2513: *Body Armor*	51.076	4.205	4.970	4.771	-	4.771	4.696	4.793	4.833	4.930	Continuing	Continuing
2928: *Exp Indirect Fire Gen Supt Wpn Sys*	13.791	2.981	22.748	0.898	-	0.898	0.490	0.500	0.500	0.500	Continuing	Continuing
3098: *Fire Support System*	149.717	5.559	5.999	7.773	-	7.773	6.856	3.100	3.183	3.246	Continuing	Continuing
3774: *Marine Corps Ammo*	0.000	0.000	1.321	1.297	-	1.297	1.306	1.314	1.326	1.353	Continuing	Continuing
3775: *Family of Internally Transportable Vehicles (FITV)*	0.253	0.000	0.245	2.180	-	2.180	2.183	0.235	0.240	0.245	Continuing	Continuing
4002: *Family of Raid Reconnaissance*	1.077	0.526	7.556	1.613	-	1.613	1.842	18.345	22.671	23.124	Continuing	Continuing
9999: *Congressional Adds*	0.000	5.000	8.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	13.000

A. Mission Description and Budget Item Justification

This PE provides modification to Marine Corps Expeditionary Ground Force Weapon Systems to increase lethality, range, survivability and operational effectiveness. In addition, the PE provides for product improvements to the family of LAVs. The Amphibious Vehicle Test Branch (AVTB) provides facilities and personnel which perform

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0206623M *I MC Ground Cmbt Spt Arms Sys*

a broad range of testing, repair and technical services to amphibious vehicles. This program is funded under Operational Systems Development Program Element (PE) because it encompasses engineering and manufacturing and manufacturing development for upgrades of existing systems.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	66.009	97.152	127.665	-	127.665
Current President's Budget	68.941	100.850	51.788	-	51.788
Total Adjustments	2.932	3.698	-75.877	-	-75.877
• Congressional General Reductions	-	-0.185			
• Congressional Directed Reductions	-	-4.117			
• Congressional Rescissions	-	-			
• Congressional Adds	-	8.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	4.639	0.000			
• SBIR/STTR Transfer	-1.706	0.000			
• Program Adjustments	0.000	0.000	-39.456	-	-39.456
• Rate/Misc Adjustments	-0.001	0.000	-36.421	-	-36.421

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *Polymer Cased Small Arms Ammunitions*	5.000	0.000
Congressional Add: *Advanced Lightweight Polymer Cased 7.62mm Ammunition*	0.000	8.000
Congressional Add Subtotals for Project: 9999	5.000	8.000
Congressional Add Totals for all Projects	5.000	8.000

Change Summary Explanation

The FY2020 funding request was reduced by $7.60M to account for the availability of prior year execution balances.

The net decrease from FY19 to FY20 attributed to a combination of the following programmatic events: Funds from project 2928 (HIMARS) realigned from BA7 in FY19 to BA4 in FY20 to support the Anti-Ship Missile (ASM) capability developmental and testing efforts and the realignment of development funding in project 1901 (Company and Battalion Mortars) to PE 0603635M, Project 7400 - Organic Precision Fires (OPF)in FY20. Additionally, there is a decrease in funding for Project 4002 (Aerial Delivery and Autonomous Distribution Entry) due to completion of testing of Unmanned Logistics System (ULS)/Aerial Delivery and Autonomous Distribution (A2D2) testing.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 1555 / *Lt Armored Vehicle Prog*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1555: *Lt Armored Vehicle Prog*	125.847	12.393	0.000	1.231	-	1.231	5.694	3.160	3.224	3.288	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Family of Light Armored Vehicles (FOLAV) consists of six fielded LAV configurations and one communications/intelligence-configured asset on an LAV chassis. The FOLAV provides a logistically self-contained, highly mobile, and lethal combined arms combat system to the Marine Air Ground Task Force (MAGTF). The LAV Product Improvement Program (PIP) funds modification and sustainment activities and the development and testing of modifications. These programs will ensure that the FOLAV is capable of conducting its assigned missions by enhancing lethality and survivability; reliability, availability, maintainability and durability; as well as reducing operations and support costs.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: LAV Reset Program	12.393	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: LAV MODIFICATIONS	0.000	0.000	1.231	0.000	1.231
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: -Initiate the integration of a new intercom system onto the Family of Light Armored Vehicles (FOLAV). -Initiate and conduct developmental test, logistics development, and validation & verification of the new intercom system for the FOLAV prior to fielding.					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1555 / *Lt Armored Vehicle Prog*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $1.231M supports the integration of a new intercom system onto the FOLAV. The new intercom is required to address obsolescence issues with the legacy intercom system, meet future USMC Tactical Communication Modernization and NSA compliance requirements, and address the number one communication issue reported by the Light Armored Reconnaissance (LAR) community. Specific activities include developmental testing, logistics support, and validation & verification of the system prior to fielding.					
Accomplishments/Planned Programs Subtotals	12.393	0.000	1.231	0.000	1.231

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/2038: *LAV PIP*	7.322	36.652	60.734	-	60.734	67.581	58.125	88.367	81.500	Continuing	Continuing
• PMC/7000: *LAV Spares*	0.000	5.735	5.884	-	5.884	6.043	5.813	11.082	11.410	Continuing	Continuing

Remarks

D. Acquisition Strategy

The LAV Modification & Sustainment program funds important vehicle modifications, support equipment and tools, and other projects that increase LAV reliability and readiness while simultaneously reducing operations and support costs. The LAV Modification and Sustainment Team is a multi-disciplinary integrated project team that employs subject matter experts in engineering, logistics, contracting and financial management to manage modification projects.

LAV Reset is an ACAT IV(M) program. The Reset program will address the Family of Light Armored Vehicles (FOLAV) automotive system obsolescence and reduced performance due to increased Gross Vehicle Weight (GVW). The Reset program will improve fleet reliability and availability by addressing the three sub-systems (power pack, driveline and steering) that specifically account for 95% of total system downtime. The program also fields a modern driver's instrument panel and LAV-25 Slip Ring. This effort delivered 8 kits (7 installed on vehicles, 1 stand-alone kit) during the engineering & manufacturing development (EMD) phase to support developmental testing (DT), fielding, integrated logistics support (ILS) products, modification instructions (MI) and engineering change proposals (ECP).

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 1555 / *Lt Armored Vehicle Prog*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development(MOD)	C/CPFF	TBD : TBD	0.000	0.000		0.000		0.750	Jan 2020	-		0.750	Continuing	Continuing	Continuing
ILS Data Development(MOD)	C/CPFF	TBD : TBD	0.000	0.000		0.000		0.196	Jan 2020	-		0.196	Continuing	Continuing	Continuing
ILS DATA DEV (Reset)	C/CPFF	GDLS : London Ontario, Canada	16.053	2.346	Dec 2017	0.000		0.000		-		0.000	0.000	18.399	-
PRODUCT DEV/ PROTOTYPES (Reset)	C/CPFF	GDLS : London Ontario, Canada	40.252	5.915	Dec 2017	0.000		0.000		-		0.000	0.000	46.167	-
Proj 1555: Prior Years Cumulative Funding	Various	N/A : N/A	37.397	0.000		0.000		0.000		-		0.000	0.000	37.397	-
		Subtotal	93.702	8.261		0.000		0.946		-		0.946	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Proj 1555: Prior Years Cumulative Funding	Various	N/A : N/A	11.860	0.000		0.000		0.000		-		0.000	0.000	11.860	-
Program Mgmt (Reset)	MIPR	TACOM : Warren, MI	11.477	2.517	Dec 2017	0.000		0.000		-		0.000	0.000	13.994	-
Program Mgmt (MOD)	MIPR	TACOM : Warren, MI	0.000	0.000		0.000		0.285	Oct 2019	-		0.285	Continuing	Continuing	Continuing
		Subtotal	23.337	2.517		0.000		0.285		-		0.285	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Proj 1555: Prior Years Cumulative Funding	Various	N/A : N/A	6.105	0.000		0.000		0.000		-		0.000	0.000	6.105	-
Devl/Oper T&E (Reset)	MIPR	RTC : AL	1.593	1.554	Jan 2018	0.000		0.000		-		0.000	0.000	3.147	-
		Subtotal	7.698	1.554		0.000		0.000		-		0.000	0.000	9.252	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 1555 / *Lt Armored Vehicle Prog*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Scheduler (Reset)	C/FFP	FEDITC, LLC : Rockville, MD	0.030	0.061	Mar 2018	0.000		0.000		-		0.000	0.000	0.091	-
Proj 1555: Prior Years Cumulative Funding	Various	N/A : N/A	1.080	0.000		0.000		0.000		-		0.000	0.000	1.080	-
		Subtotal	1.110	0.061		0.000		0.000		-		0.000	0.000	1.171	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	125.847	12.393		0.000		1.231		-		1.231	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1555 / *Lt Armored Vehicle Prog*

LAV Reset Program Plan

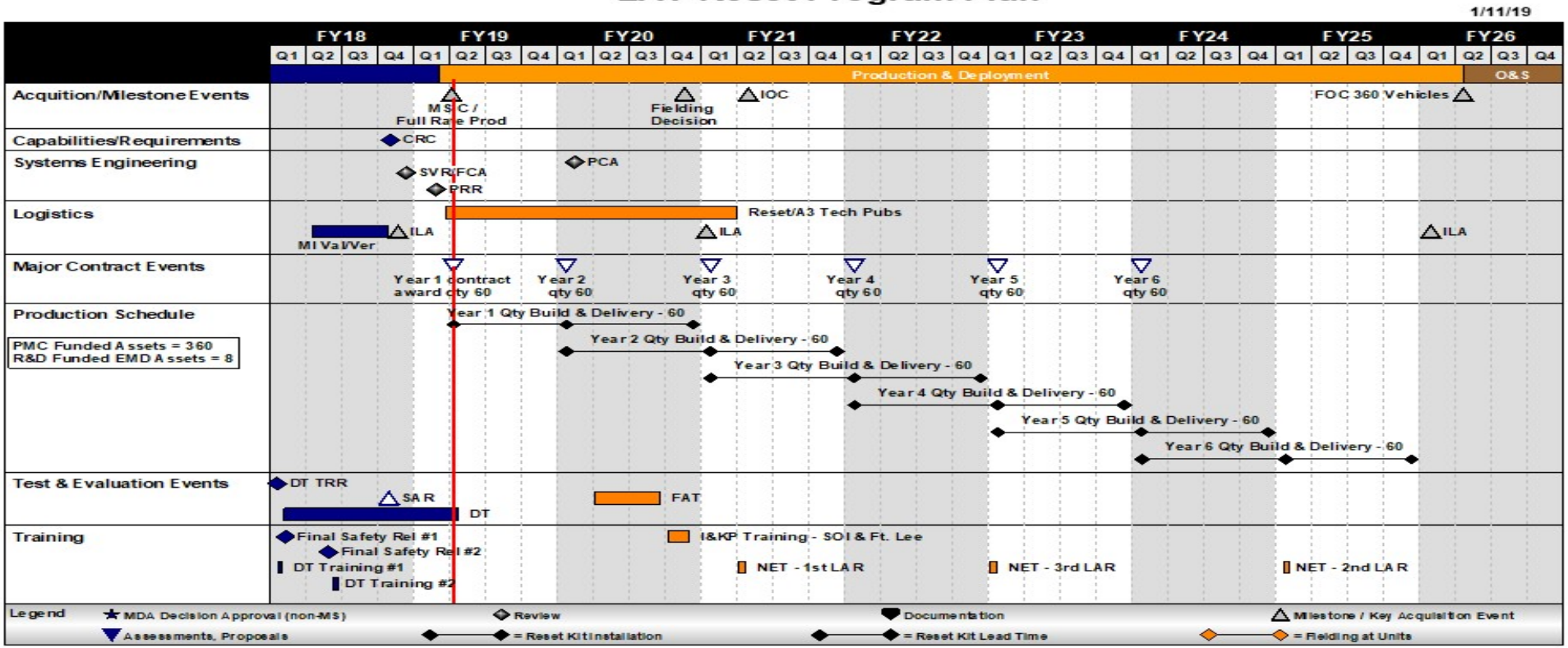

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1555 / *Lt Armored Vehicle Prog*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
LAV Reset				
Integration Contract	1	2018	1	2019
TM Development	1	2018	1	2019
EMD Vehicle Delivery	1	2018	2	2018
Developmental Testing	1	2018	2	2019
Mod Instruction Val/Ver	2	2018	4	2018
MS-C	2	2019	2	2019
Base Contract Award	2	2019	2	2019
Year 2 Award	1	2020	1	2020
Fielding Decision	4	2020	4	2020
IOC	2	2021	2	2021
Year 3 Award	1	2021	1	2021
Year 4 Award	1	2022	1	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 1557 / *Next Gen Armored Reconnaissance Vehicle (LAV replacement)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1557: *Next Gen Armored Reconnaissance Vehicle (LAV replacement)*	0.000	0.000	1.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.500
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This Project is a New Start for FY 2019. Starting in FY20, the ARV program moved from BA07/PE 0206623M/Project 1557 to BA04/PE 0603635M/Project 1558 in order to align the program to a BA more appropriate for its current acquisition phase.

A. Mission Description and Budget Item Justification

The Armored Reconnaissance Vehicle (ARV) is a replacement for the legacy light armored vehicle in the Light Armored Reconnaissance (LAR) battalions within the Marine Divisions. ARV equipped LAR Battalions perform combined arms, all weather, sustained reconnaissance and security missions in support of the Ground Combat Element. The ARV is the core capability that underpins the next generation armored reconnaissance capability concept. The ARV will be a modern combat vehicle system, capable of fighting for information, that balances competing capability demands to sense, shoot, move, communicate and remain transportable as part of the naval expeditionary force.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Armored Reconnaissance Vehicle	0.000	1.500	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: -Initiate analysis of alternatives (AoA) to assess critical technology elements for future Light Armored Reconnaissance capabilities including: technology maturity, integration risk, and manufacturing feasibility. The initial capabilities document (ICD) is currently in development.					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1557 / *Next Gen Armored Reconnaissance Vehicle (LAV replacement)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The decrease of $1.500M is the result of ARV funding realigned from program element 0206623M/BA-7 to program element 0603635M/BA-4.					
Accomplishments/Planned Programs Subtotals	0.000	1.500	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/0603640M/2223: *Marine Corps Advanced Tech. Demo.*	7.087	19.650	13.050	-	13.050	1.500	0.000	0.000	0.000	0.000	41.537
• RDTEN/0603635M/1558: *Marine Corps Grnd Cmbt/Supt Sys*	0.000	0.000	15.087	-	15.087	20.241	36.351	76.571	78.107	0.000	226.357

Remarks

The Office of Naval Research (ONR) supports the next generation Armored Reconnaissance Vehicle (ARV) project utilizing the Future Naval Capability (FNC) process in order to develop and demonstrate viable and mature technologies befitting the program's envisioned operational employment. The funding listed under section C, PE 0603640M, Proj 2223 is allocated to support ARV.

D. Acquisition Strategy

The Armored Reconnaissance Vehicle (ARV) program will be focused on providing a base combat vehicle capable of meeting evolving threats via open systems architecture and sufficient size, weight, & power (SWAP) to accommodate future growth. Subsequent programs of record will expand the ARV capability to other mission roles and integrate capabilities that emerge from other programs to further develop and enhance LAR operations.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1557 / *Next Gen Armored Reconnaissance Vehicle (LAV replacement)*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Mgmt - LAV	MIPR	TACOM : Warren, MI	0.000	0.000		0.119	Jan 2019	0.000		-		0.000	0.000	0.119	-
Analysis of Alternatives (AoA)	MIPR	TARDEC : Warren, MI	0.000	0.000		0.120	Jan 2019	0.000		-		0.000	0.000	0.120	-
Analysis of Alternatives (AoA)	MIPR	AMSAA : Aberdeen Proving Grds, MD	0.000	0.000		0.661	Jan 2019	0.000		-		0.000	0.000	0.661	-
		Subtotal	0.000	0.000		0.900		0.000		-		0.000	0.000	0.900	N/A

Remarks

Funding will be used by PM-Light Armored Vehicle (LAV) program office to resource an Analysis of Alternative (AoA) effort for the Armored Reconnaissance Vehicle program.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AoA Support Contract	C/FFP	HII-MDIS : Huntsville, AL	0.000	0.000		0.600	Jan 2019	0.000		-		0.000	0.000	0.600	-
		Subtotal	0.000	0.000		0.600		0.000		-		0.000	0.000	0.600	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		1.500		0.000		-		0.000	0.000	1.500	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1557 / *Next Gen Armored Reconnaissance Vehicle (LAV replacement)*

ARV Program Plan FY19-24 10 Jan 2019.xlsx

Armored Reconnaissance Vehicle

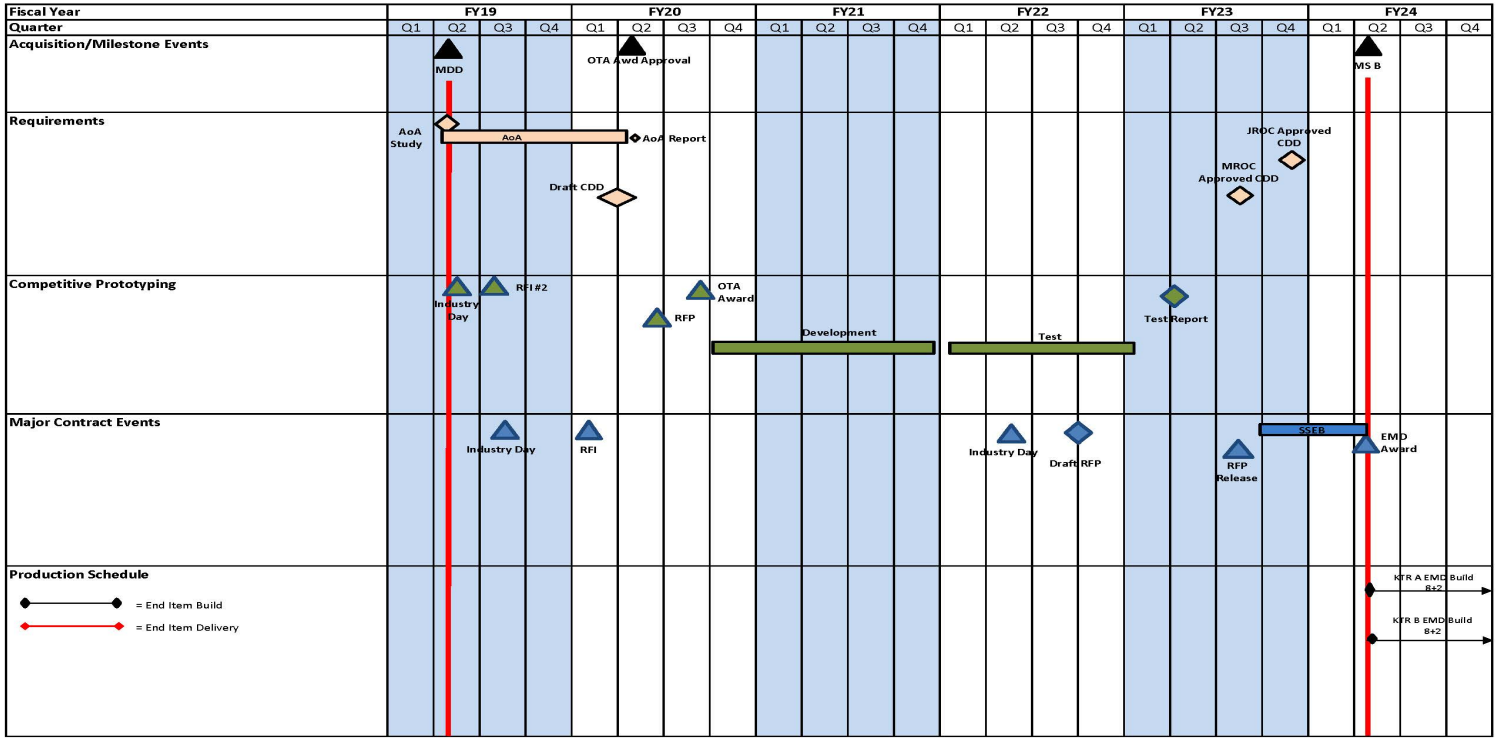

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1557 / *Next Gen Armored Reconnaissance Vehicle (LAV replacement)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1557				
Materiel Development Decision	2	2019	2	2019
ARV Analysis of Alternatives	2	2019	2	2020
OTA Competitive Prototype Award	3	2020	3	2020
Competitive Prototype Demo and Testing	4	2020	1	2023
RFP Release for EMD	3	2023	3	2023
Source Selection	3	2023	2	2024
MS B and EMD Contract Award	2	2024	2	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 1901 / *MC Grnd Wpnry Prod Improvement*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1901: *MC Grnd Wpnry Prod Improvement*	40.797	3.217	19.589	7.607	-	7.607	5.469	5.181	5.279	5.384	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project develops joint and Marine Corps unique improvements to infantry weapons technology, non-lethal systems technology, improvements for Night Vision Equipment, Rifle Combat Optics, Family of Individual Optics, and monitors national and international weapons developments.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Gunners Protection Kit	0.000	0.000	1.750	0.000	1.750
Articles:	-	-	-	-	-

Description: Gunners Protection Kit (GPK). Prior to FY20, GPK was funded within the Family of Infantry Weapons (FIWS). The TOGPK 2.0 is the planned upgrade and replacement for the Tube-Launched, Optically-Tracked, Wire-Guided Gunner Protection Kit (TGPK), currently in use with TOW High Mobility Multipurpose Wheeled Vehicle variants. TOGPK 2.0 affords the TOW gunner protection from small arms fire and Improvised Explosive Device fragmentation. TOGPK 2.0 addresses user concerns regarding limited workspace and TOW slew as well as improved visibility. The Reducible Height Gunners Protection Kit (RHGPK) enables Joint Light Tactical Vehicles (JLTV), Medium/Heavy Tactical Vehicle Replacement (MTVR) and Logistics Vehicle System Replacement (LVSR) to be transported in the lower vehicle stowage areas of Landing Platform/Dock (LPD 17) and Landing Helicopter Dock class ships.

FY 2019 Plans:

N/A

FY 2020 Base Plans:

- Initiate efforts for product improvement of TGPK and/or TOGPK 2.0 to meet established requirements for GPK as well as efforts to analyze, design, develop, and field modification of GPK completed in FY19.
- FY20 funding will procure, test and evaluate competitive bid samples for a Reducible Height GPK that meets emergent requirements for vehicle stowage aboard ships while maintaining existing protection levels.

FY 2020 OCO Plans:

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** This effort began under the Family of Infantry Weapons (FIWS) line in FY18 continuing through FY19 with the completion of the final few TOGPK 2.0 development efforts in FY19. FY20 funding increased $1.75M to invest in the development of the next GPK variant--the Reducible Height GPK.					
Title: Escalation of Force-Equipment (EoF-E) ***Articles:*** ***Description:*** Escalation of Force Equipment (EoF-E) is a mod funding line to support/sustain all fielded EoF equipment and capabilities. Additionally, EoF-E supports type-classification, testing and procurement of new advancements and technologies to provide an increased capability over existing or obsolescent equipment currently in or associated with the Escalation of Force Mission Modules (EoF-MMs). ***FY 2019 Plans:*** - Continue to assess upgrades and replacements to the EoF-MM to sustain/support equipment and capabilities. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The USMC decided to terminate the Escalation of Force Equipment program in order to better align with the National Defense Strategy.	0.057 -	0.078 -	0.000 -	0.000 -	0.000 -
Title: Combat Optics ***Articles:*** ***Description:*** Combat Optics is a program that provides for research and development, as well as ammunition to support testing and assessment of optical systems and implementation of modifications for these systems as well as life-cycle management efforts. The research and development of future capabilities include, but are not limited to variable power day optics and fused/multi-spectral (e.g., combined image intensifier, thermal imaging, and short wave infrared) optical and laser systems. ***FY 2019 Plans:***	1.091 -	2.927 -	3.955 -	0.000 -	3.955 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Increase of $1.205M in FY19 is required to initiate product development, test and evaluation, and pre-EMD transition efforts for Advanced Sniper Rifle (ASR) Day and Night Sights. -Continue technology development and evaluation to support life cycle extension and improvement of current optics and inform future optics requirements generation to address capability gaps. -Complete evaluation of potential solutions for variable power Squad Common Optic. ***FY 2020 Base Plans:*** -Continue product development, test and evaluation, and pre-EMD transition efforts for Advanced Sniper Rifle (ASR) Day and Night Sights. -Continue technology development and evaluation to support life cycle extension and improvement of current optics and inform future optics requirements generation to address capability gaps. -Initiate development of the optical fire control system for the Next Generation Squad Weapon. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** -Increase of $1.028M in FY20 is required to initiate development of the optical fire control system for the Next Generation Squad Weapon.					
Title: Company and Battalion Mortars	0.379	14.686	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Company and Battalion Mortars is a program that provides for continuous monitoring, research and development, integration and qualification testing, certification and accreditation, assessment and implementation of multi-service and USMC unique system modifications and improvements for mortar and mortar fire control systems. Efforts include advance capability extended range mortar systems and mortar fire control systems using Android operating systems capable of digital communications, mapping and geo-location. ***FY 2019 Plans:*** Advanced Capability Extended Range Mortar (ACERM) Plans: -Type qualify the Extended Range Mortar Ammunition (ERMA) propellant charge for ACERM. ERMA addresses the increased mass of the ACERM cartridge and is compliant with Insensitive Munition requirements. -Develop a Navy Munitions Document (NMD) for ERMA. NMD is required for weapons safety review. -Miniature Mission Setter development and integration with ACERM. ACERM requires a precision weapon pre-launch programming device.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1901 / *MC Grnd Wpnry Prod Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Lightweight Handheld Mortar Ballistic Calculator/Mortar Fire Control Application integration with ACERM. Required to compute aero-ballistic calculations for ACERM. -Design and development of mortar round packaging. Necessary to accommodate ACERM dimensional differences and environmental requirements. Other plans: -Continue LHMBC software upgrades to maintain legacy system configuration baseline. -Complete Mortar Fire Control Application (MFCA) development, qualification testing, certification and accreditation to achieve IOC. -Conduct MFCA integration testing against evolving common Marine Corps hardware solutions. -Initiate development, qualification testing, certification and accreditation of MFCA Increment 2 system Net-Ready key performance parameters required for digital communication, mapping and geo-location services. -Purchase Non-Developmental Items (NDI)for testing and evaluation of candidate systems and modifications for company and battalion mortar fire control systems. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The USMC decided to pursue a different technological solution to close this extended range precision fire capability gap.					
Title: Family of Infantry Weapons Systems (FIWS)	1.690	1.898	1.902	0.000	1.902
Articles:	-	-	-	-	-
Description: Family of Infantry Weapons Systems (FIWS) is a program that provides for continuous monitoring, research and development, assessment of and implementation of Joint Service and USMC unique system modifications, as well as new acquisition efforts. Efforts such as: sustain weapon capability, enhance Gunner Protection Kits (GPK), and improve the performance, maintainability, supportability, service life, ergonomics, and safety enhancements of Infantry Weapons Systems. GPK costs separated from FIWS beginning in FY20. ***FY 2019 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1901 / *MC Grnd Wpnry Prod Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Continue Product Improvement Program (PIP) testing for various emergent requirements, including Service Rifle PIP, and Advanced Sniper Rifle Development. -Continue efforts to analyze, design, develop, and field modifications. -Continue performance evaluation of various types of ammunition currently under development. -Continue product improvement of Sniper and Special Purpose systems and their ancillary support equipment in order to meet established or emerging requirements. GPK has its own funding line beginning in FY20. The following FY19 efforts will transition from FIWS to GPK: -Continue efforts to analyze, design, develop, and field modifications (to include GPKs). -Continue product improvement of TGPK and/or TOGPK 2.0 in order to meet requirements outlined in Requirements Memorandum for GPK. -Continue efforts to analyze, design, and develop a Reducible Height GPK that meets emergent requirements for vehicle stowage aboard ships while maintaining existing protection levels. ***FY 2020 Base Plans:*** -Continue Product Improvement Program (PIP) testing for various emergent requirements, including Service Rifle PIP (Next Gen Carbine), and Machine Gun Improvements. -Continue performance evaluation of various types of ammunition currently under development. -Continue product improvement of Small Arms Weapon Systems (which includes, but is not limited to) Sniper and Special Purpose systems, and their ancillary support equipment in order to meet established or emerging requirements. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.004M from FY19 to FY20 is due to additional requirements for travel in support of ammunition development.					
Accomplishments/Planned Programs Subtotals	3.217	19.589	7.607	0.000	7.607

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1901 / *MC Grnd Wpnry Prod Improvement*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/2220-01: *Family of Infantry Weapons Systems*	9.108	28.292	17.022	-	17.022	8.970	13.088	7.983	8.142	Continuing	Continuing
• PMC/2220-02: *Company and Battalion Mortars*	0.810	2.666	3.018	-	3.018	3.474	3.543	3.614	3.686	Continuing	Continuing
• PMC/2220-03: *Escalation of Force - Equip (EoF-E)*	0.000	0.228	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/4620: *Combat Optics*	36.264	59.052	98.122	-	98.122	75.094	52.504	52.684	53.737	Continuing	Continuing
• PMC/2220-04: *Gunners Protection Kit*	0.000	0.000	11.365	-	11.365	13.149	19.312	0.000	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

These programs range from off-the-shelf modifications to developmental items for safety, reliability, and technology upgrades to meet Marine Corps requirements.

Family of Infantry Weapons Systems (FIWS):
The FIWS program strategy is to explore, research and recommend efforts to address and identify solutions to performance, reliability and safety design issues through various means, including commercial off-the-shelf (COTS) components. This includes efforts to improve Individual and Crew Served Weapon Systems, evaluation of various types of ammunition under development, and testing of Product Improvement Programs in order to meet various emergent requirements.

Combat Optics:
Combat Optics acquisition, management and contracting strategies support the research, development, modification and improvement of optics, night vision and laser systems such as magnified day optics, thermal imagers, image intensifying (I2) systems, lasers, and illuminators.

Company and Battalion Mortars:
Acquisition, management, and contracting strategies support multiservice and USMC unique system modifications and improvements for the lightweight company and battalion mortars and mortar fire control systems to provide immediate indirect fires in support of mounted and dismounted forces to the company and battalion level. Efforts include: 1) participation in a Future Naval Capability (FNC) effort to transition the Advanced Capability Extended Range Mortar (ACERM), developed/ demonstrated by the Office of Naval Research, to extend the maximum range and precision of 81mm high explosive munitions and provide greater lethality at ranges out to 20 km, and 2) an Android-based Mortar Fire Control Application (MFCA) allowing mortar crews to send and receive digital call-for-fire messages, calculate ballistic solutions, and navigate.

Gunners Protection Kit (GPK):

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1901 / *MC Grnd Wpnry Prod Improvement*

Acquisition, management, and contracting strategies to support a USMC unique system requirement for the Reducible Height Gunners Protection Kit in support of loading and unloading vehicles aboard amphibious carriers.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 1901 / *MC Grnd Wpnry Prod Improvement*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Company and Battalion Mortars	MIPR	Picatinny Arsenal : Picatinny, NJ	2.722	0.379	Apr 2018	3.208	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Company and Battalion Mortars	WR	NSWC, Crane : Crane, IN	0.000	0.000		7.850	Feb 2019	0.000		-		0.000	0.000	7.850	-
Company and Battalion Mortars	WR	NSWC, Dahlgren : Dahlgren, VA	0.000	0.000		3.628	Feb 2019	0.000		-		0.000	0.000	3.628	-
Gunners Protection Kit	C/CPIF	MCSC : Quantico, VA	0.000	0.000		0.000		1.750	Dec 2019	-		1.750	Continuing	Continuing	Continuing
Family of Infantry Weapons Systems	MIPR	ARDEC : Picatinny, NJ	0.821	0.591	Jun 2018	1.000	Mar 2019	0.500	Feb 2020	-		0.500	0.000	2.912	-
Family of Infantry Weapons Systems	C/FFP	MCSC : Quantico, VA	0.000	0.479	Sep 2018	0.000		0.000		-		0.000	0.000	0.479	-
Family of Infantry Weapons Systems	WR	NSWC : Crane, IN	0.000	0.000		0.250	Apr 2019	0.350	Mar 2020	-		0.350	0.000	0.600	-
Combat Optics	MIPR	ARDEC : Picatinny, NJ	0.000	0.075	Apr 2018	1.728	Mar 2019	2.612	Mar 2020	-		2.612	0.000	4.415	-
Proj 1901: Prior Years Cum Funding (Product Dev)	Various	Various : Various	5.497	0.000		0.000		0.000		-		0.000	0.000	5.497	-
		Subtotal	9.040	1.524		17.664		5.212		-		5.212	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Family of Infantry Weapons Systems	Various	Travel/IMPAC : Quantico, VA	0.414	0.111	Sep 2018	0.145	Aug 2019	0.174	Mar 2020	-		0.174	Continuing	Continuing	Continuing
Combat Optics	WR	NSWC : Crane, IN	0.839	0.261	Dec 2017	0.257	Jul 2019	0.770	Jul 2020	-		0.770	Continuing	Continuing	Continuing
Combat Optics	Various	Travel/IMPAC : Quantico, VA	0.000	0.059	Jul 2018	0.000		0.000		-		0.000	0.000	0.059	-
Proj 1901: Prior Years Cum Funding (Support)	Various	Various : Various	13.708	0.000		0.000		0.000		-		0.000	0.000	13.708	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	14.961	0.431		0.402		0.944		-		0.944	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Combat Optics	WR	NSWC : Crane, IN	0.184	0.443	Jan 2018	0.000		0.523	Apr 2020	-		0.523	0.000	1.150	-
Combat Optics	MIPR	Army : Aberdeen, MD	0.109	0.055	Jun 2018	0.000		0.000		-		0.000	0.000	0.164	-
Combat Optics	MIPR	DLA : Philadelphia, PA	0.249	0.198	Aug 2018	0.892	Mar 2019	0.000		-		0.000	0.000	1.339	-
Family of Infantry Weapons Systems	WR	NSWC Crane : Crane, IN	0.875	0.200	Dec 2017	0.399	Jan 2019	0.726	Jan 2020	-		0.726	Continuing	Continuing	Continuing
Family of Infantry Weapons Systems	WR	NSWC : Crane, IN	0.452	0.150	Dec 2017	0.000		0.000		-		0.000	0.000	0.602	-
Proj 1901: Prior Years Cum Funding (T&E Eval)	Various	Various : Various	12.973	0.000		0.000		0.000		-		0.000	0.000	12.973	-
		Subtotal	14.842	1.046		1.291		1.249		-		1.249	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Family of Infantry Weapons Systems	C/FFP	MCSC : Quantico, VA	0.927	0.159	Mar 2018	0.104	Mar 2019	0.152	Mar 2020	-		0.152	Continuing	Continuing	Continuing
Combat Optics	C/FFP	MCSC : Quantico, VA	0.000	0.000		0.050	Mar 2019	0.050	Mar 2020	-		0.050	0.000	0.100	-
Escalation of Force Equipment	C/FFP	MCSC : Quantico, VA	0.000	0.057	Mar 2018	0.078	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Proj 1901: Prior Years Cum Funding (Mgmt Services)	Various	Various : Various	1.027	0.000		0.000		0.000		-		0.000	0.000	1.027	-
		Subtotal	1.954	0.216		0.232		0.202		-		0.202	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	40.797	3.217		19.589		7.607		-		7.607	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1901 / *MC Grnd Wpnry Prod Improvement*

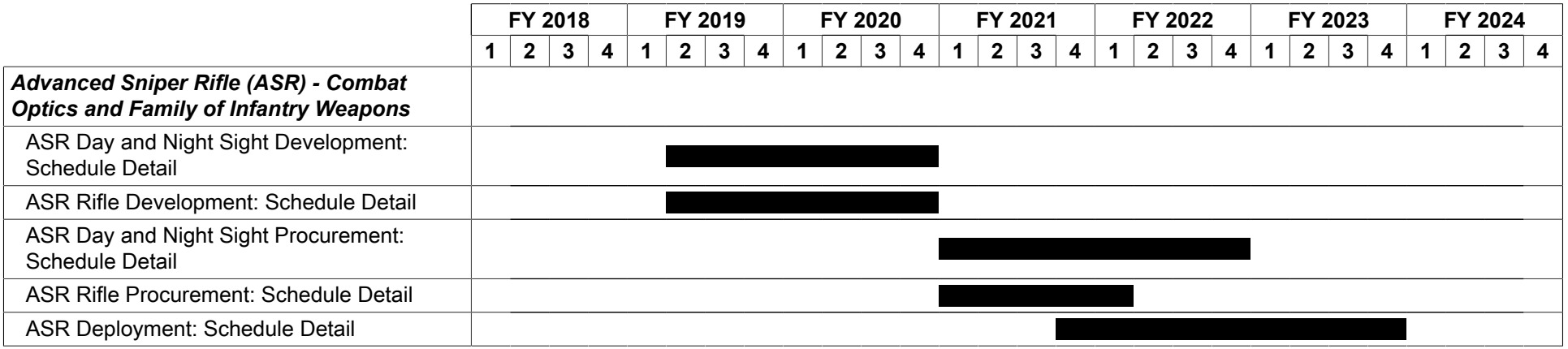


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 1901 / *MC Grnd Wpnry Prod Improvement*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Advanced Sniper Rifle (ASR) - Combat Optics and Family of Infantry Weapons				
ASR Day and Night Sight Development: Schedule Detail	2	2019	4	2020
ASR Rifle Development: Schedule Detail	2	2019	4	2020
ASR Day and Night Sight Procurement: Schedule Detail	1	2021	4	2022
ASR Rifle Procurement: Schedule Detail	1	2021	1	2022
ASR Deployment: Schedule Detail	4	2021	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2086 / *Soldier/Marine Enhancement*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2086: *Soldier/Marine Enhancement*	32.915	3.418	3.353	2.539	-	2.539	4.037	3.886	3.516	3.586	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Marine Expeditionary Rifle Squad (MERS) mission is to manage the infantry squad, "squad as a system", by conducting integration, systems engineering, human factors, and modernization efforts across all the products that are worn, carried, and consumed by the rifle squad. Physical integration, capability analysis, modeling and simulation, ergonomics, and usability assessments are facilitated by this program in working with the various program managers and project officers in the development of their unique items that contribute to the squads overall capabilities. MERS operates and manages the Gruntworks Squad Integration Facility, including facilities sustainment, restoration and modernization of the facility, to meet mission requirements in order to support integration and assessments of equipment. MERS is engaging industry and academia in search of innovative technologies that can enhance infantry capabilities via a Partnership Intermediary Agreement. Weight and volume management are fundamental considerations in the insertion or modernization of any squad equipment. MERS works with Joint and NATO soldier modernization programs to harvest new technologies to increase the capability of the rifle squad. The program also ensures the integration of the rifle squad into the various mobility platforms currently in service and being developed to ensure a Marine and his equipment can operate effectively. The Marine Corps anthropometry survey will be initiated in FY18 for completion in FY20. This program is essential to ensure the combined synergistic equipment effects enhance the war-fighting functions of the Marine rifle squad towards the strategic Marine Corps war fighting vision for the future.

Ammunition Life Cycle Management Program responsibility for Total Life Cycle Management for ground conventional munitions. Accordingly, PM Ammo is a member of the joint services Ammunition Logistics Research and Development IPT (ALR&D IPT). Each year the IPT solicits R&D projects from all of the services. The IPT looks for innovative ideas to enhance logistical support for munitions. Approximately 20 Ammo Logistics R&D projects are voted on each year by the IPT. They are prioritized by voting actions of the Senior Review Board and funding sources are identified. Since the funding for ammunition procurement is outpaced by annual expenditures, ammunition logistics R&D projects designed to extend the shelf life of our current inventory, provide enhanced packaging to "lighten the load" of our munitions, and other such projects will go a long way to ensure the Marine Corps can maintain combat readiness with a reliable conventional ammunition inventory into the future.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Marine Expeditionary Rifle Squad (MERS)	2.622	3.353	2.539	0.000	2.539
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue to support all the Marine Corps Systems Command program offices that provide equipment to the Marine rifle squad or provide mobility platforms that support the squad.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2086 / *Soldier/Marine Enhancement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Continue to resource improvements and operating costs to support the mission of Gruntworks Squad Integration Facility. This includes resourcing minor construction for facilities sustainment, restoration and modernization efforts, below the MILCON threshold. -Continue to utilize the Gruntworks Squad Integration Facility as an asset to execute innovation and technology searches and projects, R&D integration projects, prototyping, rapid assessment of technologies, and usability trials. -Continue investment into Gruntworks Squad Integration Facility enablers and capabilities. -Continue to conduct human performance trials utilizing MC-LEAP and other data collection methodologies in order to develop mobility metrics. -Continue to conduct usability trials, requirements generation workshops, and limited user evaluations for digital interoperability, handheld devices and applications at the infantry platoon and squad level. -Continue to support integration of body armor and load bearing systems with human factors expertise. -Continue to conduct mobility experiments using the Marine Corps Load Effects Assessment Program and associated Policy Letters and Requirements Documents. -Continue to develop integrated seating solutions for combat equipped Marines for ACV 1.1, ACV 1.2, JLTV and other mobility programs and synchronize seat belt and retention systems among the platforms. -Continue to conduct R&D on squad systems in conjunction with Army squad system projects. -Continue to conduct surveys with post deploying infantry battalions on usability and integration of equipment utilized during deployment. -Continue to conduct human performance testing of Marines utilizing current and prototype configurations of infantry rifle squad equipment. -Continue to evaluate and transition technologies from ONR and other S&T activities that enhance capabilities of the squad or provide a desired capability. -Continue to seek weight and volume reduction replacements for current infantry equipment that support integration of components. -Continue to implement capability requirements from MERS Initial Capabilities Document (ICD). -Continue to prioritize projects with the Infantry Working Group and utilize the Partnership Intermediary Agreement as mediation to pursue innovation and technology. -Continue Marine Corps anthropometry survey in order to provide an updated database in 2020. ***FY 2020 Base Plans:*** -Continue to support all the Marine Corps Systems Command program offices that provide equipment to the Marine rifle squad or provide mobility platforms that support the squad.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2086 / *Soldier/Marine Enhancement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Continue to resource improvements and operating costs to support the mission of Gruntworks Squad Integration Facility. This includes resourcing minor construction for facilities sustainment, restoration and modernization efforts, below the MILCON threshold. -Continue to utilize the Gruntworks Squad Integration Facility as an asset to execute innovation and technology searches and projects, R&D integration projects, prototyping, rapid assessment of technologies, and usability trials. -Continue investment into Gruntworks Squad Integration Facility enablers and capabilities. -Continue to conduct human performance trials utilizing MC-LEAP and other data collection methodologies in order to develop mobility metrics. -Continue to conduct usability trials, requirements generation workshops, and limited user evaluations for digital interoperability, handheld devices and applications at the infantry platoon and squad level. -Continue to support integration of body armor and load bearing systems with human factors expertise. -Continue to conduct mobility experiments using the Marine Corps Load Effects Assessment Program and associated Policy Letters and Requirements Documents. -Continue to develop integrated seating solutions for combat equipped Marines for ACV 1.1, ACV 1.2, JLTV and other mobility programs and synchronize seat belt and retention systems among the platforms. -Continue to conduct R&D on squad systems in conjunction with Army squad system projects. -Continue to conduct surveys with post deploying infantry battalions on usability and integration of equipment utilized during deployment. -Continue to conduct human performance testing of Marines utilizing current and prototype configurations of infantry rifle squad equipment. -Continue to evaluate and transition technologies from ONR and other S&T activities that enhance capabilities of the squad or provide a desired capability. -Continue to seek weight and volume reduction replacements for current infantry equipment that support integration of components. -Continue to implement capability requirements from MERS Initial Capabilities Document (ICD). -Continue to prioritize projects with the Infantry Working Group and utilize the Partnership Intermediary Agreement as mediation to pursue innovation and technology. -Continue Marine Corps anthropometry survey in order to provide an updated database in 2020. -Conduct Technology research and integration in order to develop the Infantry Helmet System.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2086 / *Soldier/Marine Enhancement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Explore and prototype Manned- unmanned teaming capabilities for small Unmanned Air Systems (UAS) and ground applications. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request was reduced to account for the availability of prior year execution balances.					
Title: Ammunition Life Cycle Management ***Articles:*** ***FY 2019 Plans:*** Funds transferred to Project 3774. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** N/A	0.796 -	0.000 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	3.418	3.353	2.539	0.000	2.539

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Non Developmental Item/Commercial off the Shelf (NDI/COTS).

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2086 / *Soldier/Marine Enhancement*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Marine Corps Systems Command : Quantico, VA	12.792	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	12.792	0.000		0.000		0.000		-		0.000	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Ammunition Life Cycle Management	WR	NSWC : Indian Head, MD	0.719	0.366	Mar 2018	0.000		0.000		-		0.000	0.000	1.085	-
Ammunition Life Cycle Management	MIPR	ARDEC : Picatinny Arsenal, NJ	0.000	0.430	Mar 2018	0.000		0.000		-		0.000	0.000	0.430	-
MERS Support	Various	Marine Corps Systems Command : Quanico, VA	0.926	0.149	Oct 2018	0.160	Dec 2018	0.215	Oct 2019	-		0.215	0.000	1.450	-
MERS Technical Support	TBD	TBD : Norfolk, VA	0.000	0.177	Sep 2018	1.040	Apr 2019	0.000		-		0.000	0.000	1.217	-
MERS Technical Support	C/IDIQ	Various : Various	0.320	0.000		0.200	Mar 2019	0.100	Dec 2019	-		0.100	Continuing	Continuing	Continuing
MERS Technical Support - PIA	C/CPFF	MCSC : Quantico, VA	1.128	0.995	Jan 2018	1.738	Dec 2018	2.000	Dec 2019	-		2.000	0.000	5.861	Continuing
MERS Technical Support	C/CPFF	MCSC : Quantico, VA	0.000	0.693	Apr 2018	0.080	Feb 2019	0.224	Jan 2020	-		0.224	0.000	0.997	Continuing
MERS Prior Years Cumulative Funding	Various	Various : Various	4.785	0.000		0.000		0.000		-		0.000	0.000	4.785	-
		Subtotal	7.878	2.810		3.218		2.539		-		2.539	Continuing	Continuing	N/A

Remarks

Various contracts, MIPRS, Work Requests and Supply Requisitions are awarded through the year for the various initiatives in the MERS programs. Contract method reflects where the majority of the funding is allocated. Contract award date reflects the first of multiple awards.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2086 / *Soldier/Marine Enhancement*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MERS Developmental Test & Eval	MIPR	DLA : Philadelphia, PA	0.395	0.423	May 2018	0.000		0.000		-		0.000	0.000	0.818	-
MERS Developmental Test & Eval	MIPR	AFB : Hanscom	0.291	0.065	Sep 2018	0.000		0.000		-		0.000	0.000	0.356	-
MERS Developmental Test & Eval (Articles)	Various	MCSC : Quantico, VA	0.150	0.120	Feb 2018	0.135	May 2019	0.000		-		0.000	0.000	0.405	-
MERS Prior Years Cumulative Funding	Various	Various : Various	6.063	0.000		0.000		0.000		-		0.000	0.000	6.063	-
MEP Prior Years Cumulative Funding	C/FFP	MCSC : Various	5.346	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	12.245	0.608		0.135		0.000		-		0.000	Continuing	Continuing	N/A

Remarks

Various contracts, MIPRS, Work Requests and Supply Requisitions are awarded through the year for the various initiatives in the Marine Enhancement Program (MEP) and MERS programs, therefore a specific contract award date cannot be identified. Contract award date reflects the first of multiple awards.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	32.915	3.418		3.353		2.539		-		2.539	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2086 / *Soldier/Marine Enhancement*

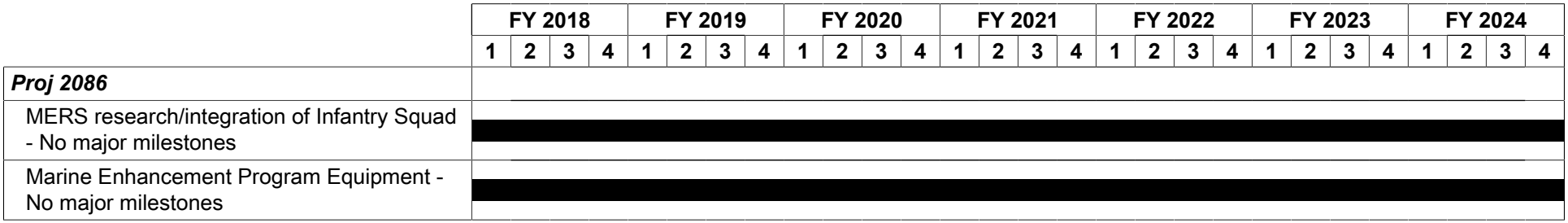


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2086 / *Soldier/Marine Enhancement*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2086				
MERS research/integration of Infantry Squad - No major milestones	1	2018	4	2024
Marine Enhancement Program Equipment - No major milestones	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2112 / *Lightweight 155mm Howitzer*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2112: *Lightweight 155mm Howitzer*	4.969	0.000	1.800	2.000	-	2.000	0.000	2.000	0.000	0.000	0.000	10.769
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

LW155 (also known as the M777A2 howitzer) provides all weather, day/night direct, reinforcing, and general support fires to maneuver forces as well as direct support artillery. It is a joint program between the Marine Corps and Army, which is additionally supporting various foreign military purchases of the weapon system. The LW155 was first fielded by the Marine Corps in April 2005 and completed fielding in April 2013. The Army has fielded the system to its Stryker Brigades and Fires Brigades and completed fielding to its Infantry Brigades in September 2018. The LW155 is being significantly utilized in the Middle East in support of Operation Inherent Resolve. This budget item supports system updates to maintain and increase performance and lethality. M777A2 is the prominent weapon of the Marine indirect fires triad and currently the only cannon in the Service. Modernization efforts, to include extended range, will keep the M777 relevant to the concept of operations (distributed units operating with increased dispersion) envisioned in the Marine Operating Concept. Current RDTE efforts are focused on extending the range of the M777A2 to reduce the threat of being out ranged by potential adversaries and meeting the range key performance parameter objective distance (>40KM) as stated in the Joint US Army, USMC Operational Requirements Document (JORD) for Advanced Towed Cannon System. The USMC and US Army are leveraging technology being developed as part of the Extended Range Cannon Artillery (ERCA) program by the US Army. The ERCA program is a suite of technologies, cannon, ammunition and fire control, to increase the range of cannon artillery to exceed peer competitors range (>70KM).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Lightweight 155mm Howitzer Product Improvements	0.000	1.800	2.000	0.000	2.000
Articles:	-	-	-	-	-
FY 2019 Plans: -Initiate acquisition of prototyped recoil and structural hardware components such as pepper pots, yoke, road arms, and buffers in order to integrate the larger cannon (55 caliber vs current 39 caliber) onto the M777 Extended Range (M777ER) howitzer platform.					
FY 2020 Base Plans: -Operational Assessment of M777 Extended Range (ER) scheduled for 4th Quarter FY20.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2112 / *Lightweight 155mm Howitzer*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase of $0.200M from FY19 to FY20 accounts for transportability and mobility assessment of M777ER.					
Accomplishments/Planned Programs Subtotals	0.000	1.800	2.000	0.000	2.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 2185: *155MM Ltwt Towed Howitzer*	20.259	47.158	25.065	-	25.065	0.072	0.074	2.075	2.116	0.000	1,443.398

Remarks

D. Acquisition Strategy

Production and fielding of the LW155 has concluded and has now entered into the Sustainment Life Cycle Phase. Current RDTE efforts are focused on extending the range of the M777A2 to reduce the threat of being out ranged by potential adversaries and meeting the range key performance parameter objective distance (>40KM) as stated in the Joint US Army, USMC Operational Requirements Document (JORD) for Advanced Towed Cannon System, but deferred during Engineering Manufacturing and Development due to technology maturity, cost and schedule. The USMC and US Army are leveraging technology being developed as part of the Extended Range Cannon Artillery (ERCA) program by the US Army. The ERCA program is a suite of technologies, cannon, ammunition and fire control, to increase the range of cannon artillery to exceed peer competitors range (>70KM). A successful Critical Design Review in FY19, paves the way for an operational assessment of the M777 Extended Range howitzer at the end of FY20 to support the decision point for procurement in support of a Urgent Materiel Release.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2112 / *Lightweight 155mm Howitzer*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LW155 Product Improvements	MIPR	ARDEC : Picatinny Arsenal, NJ	4.969	0.000		1.800	Oct 2018	0.000		-		0.000	0.000	6.769	Continuing
		Subtotal	4.969	0.000		1.800		0.000		-		0.000	0.000	6.769	N/A

Remarks

FY17 funding provided for the M777 Extended Range Muzzle Brake prototyping.
FY19 funding provided for M777 Extended Range objective hardware prototyping for system demonstration in FY20. Hardware items include enhanced structural components (pepper pots, road arms, yoke and buffer).

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mobility and Firing Test	MIPR	Yuma Proving Ground : Yuma, AZ	0.000	0.000		0.000		2.000	Jun 2020	-		2.000	0.000	2.000	-
		Subtotal	0.000	0.000		0.000		2.000		-		2.000	0.000	2.000	N/A

Remarks

FY20 funding supports firing and mobility tests of Extended Range howitzer.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	4.969	0.000		1.800		2.000		-		2.000	0.000	8.769	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2112 / *Lightweight 155mm Howitzer*

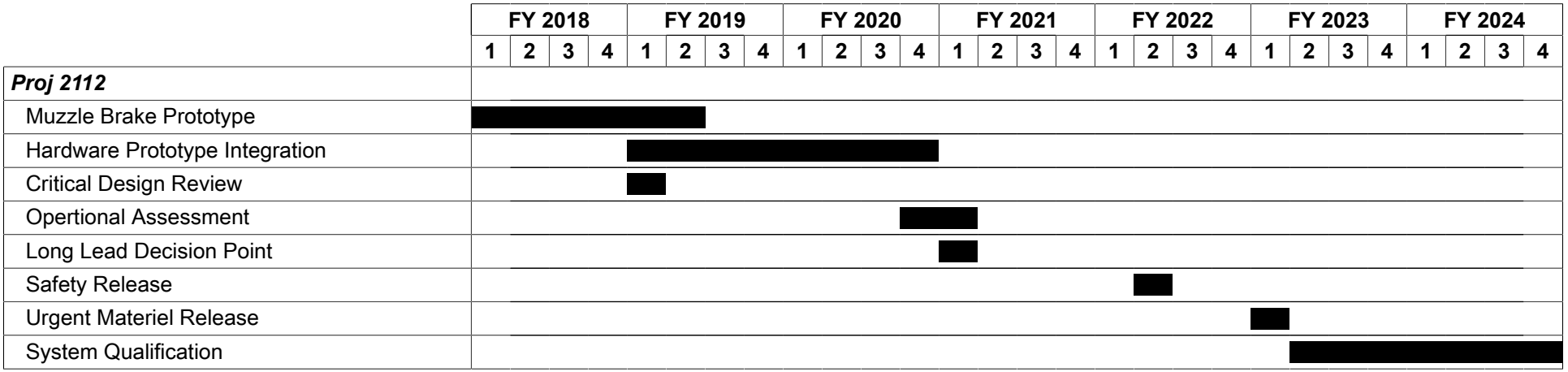


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2112 / *Lightweight 155mm Howitzer*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2112				
Muzzle Brake Prototype	1	2018	2	2019
Hardware Prototype Integration	1	2019	4	2020
Critical Design Review	1	2019	1	2019
Opertional Assessment	4	2020	1	2021
Long Lead Decision Point	1	2021	1	2021
Safety Release	2	2022	2	2022
Urgent Materiel Release	1	2023	1	2023
System Qualification	2	2023	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*				Project (Number/Name) 2237 / *Amphibious Vehicle Test*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2237: *Amphibious Vehicle Test*	10.323	4.372	2.297	2.820	-	2.820	2.886	2.947	3.007	3.067	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Amphibious Vehicle Test Branch (AVTB) is a component of Marine Corps Systems Command (MCSC) and is responsible for the operation and management of the amphibious vehicle test facility, which is the Department of Defense's only certified amphibious vehicle test capability. The AVTB generates test plans, executes, analyzes and reports results of developmental and integrated test and evaluation events. They predominately support the development and performance validation of amphibious and ground combat vehicle system capabilities. The AVTB conducts and supports testing for the MCSC; Navy PEOs and Program Management Offices; the Office of Naval Research; and HQMC PP&O and CD&I, as directed. The AVTB mission is to plan, execute, analyze and report developmental and integrated test and evaluation of USMC and Joint Service tracked, wheeled and ground combat vehicles and other demonstration events in order to characterize the performance of amphibious and ground combat vehicle systems and enable informed acquisition decisions for the future warfighting capabilities.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Title: Contracts and Test and Evaluation Support Assets	4.372	2.297	2.820	0.000	2.820
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue to test other MCSC, Navy PEOs, and Joint Service programs. -Complete ACV 1.1 Test Readiness Review -Initiate ACV 1.1 Water Mobility testing, Communications Testing, Supportability/Human Factor testing, and Reliability Qualification Testing, Logistics Demonstration (PD Phase)					
FY 2020 Base Plans: -Continue to test other MCSC, Navy PEOs, and Joint Service programs. -Complete ACV 1.1 Water Mobility testing, Communications Testing, Supportability/Human Factor testing, Reliability Qualification Testing, and Logistics Demonstration (PD Phase) -Initiate ACV 1.1 Initial Operational Test and Evaluation (IOT&E)					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Increase from FY 2019 to FY 2020 accounts for the initiation of IOT&E for ACV 1.1.					
Accomplishments/Planned Programs Subtotals	4.372	2.297	2.820	0.000	2.820

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2237 / *Amphibious Vehicle Test*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Work will be led in-house by the Amphibious Vehicle Test Branch (AVTB). As DoD's only certified amphibious test and evaluation capability, AVTB will provide technical and user information regarding the performance of amphibious and ground combat vehicles during developmental testing,capabilities demonstrations and assessments, integrated and follow-on test evaluations events for Marine Corps and Joint Service Program Managers of system activities to support future warfighting capabilities. Required DT&E test assets will be resourced organically with military and civilian personnel, and as required contracted by the MCSC, such as boat operations and maintenance, professional data collection and reduction, test instrumentation and test-peculiar programming and technical writing.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2237 / *Amphibious Vehicle Test*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	2.430	0.000		0.000		0.000		-		0.000	0.000	2.430	-
		Subtotal	2.430	0.000		0.000		0.000		-		0.000	0.000	2.430	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Facility/Test Infrastucture	C/FFP	NAVFAC, SW : Camp Pendleton, CA	0.483	0.097	Oct 2017	0.325	Oct 2018	0.317	Oct 2019	-		0.317	Continuing	Continuing	Continuing
Test Assets/Boat Operators	C/FFP	MCTSSA Camp Pend : Camp Pendleton, CA	0.637	0.670	Apr 2018	0.905	Apr 2019	0.909	Apr 2020	-		0.909	0.000	3.121	-
Test Assets/AAV Operators	C/FFP	MCTSSA Camp Pend : Camp Pendleton CA	0.624	0.948	Apr 2018	0.000		0.000		-		0.000	0.000	1.572	-
Vehicle Support	WR	RCO Camp Pendleton : Camp Pendleton, CA	0.065	0.230	Oct 2017	0.086	Oct 2018	0.093	Oct 2019	-		0.093	Continuing	Continuing	Continuing
Hazmat POL PPE	Various	MCTSSA Camp Pendleton : Camp Pendleton, CA	0.330	0.083	Oct 2017	0.065	Oct 2018	0.084	Oct 2019	-		0.084	0.000	0.562	-
Crane Test Support	C/IDIQ	MCTSSA Camp Pendleton : Camp Pendleton, CA	0.085	0.105	Oct 2018	0.070	Oct 2019	0.074	Oct 2019	-		0.074	0.000	0.334	-
Test article fuel (J8)	Various	AVTB : Camp Pendleton, CA	0.681	0.150	Oct 2017	0.070	Oct 2018	0.094	Oct 2019	-		0.094	0.000	0.995	-
EMS Support	C/CPFF	MCTSSA : Camp Pendleton, CA	0.000	0.150	Aug 2018	0.000	Dec 2018	0.000	Dec 2019	-		0.000	0.000	0.150	-
Test support Fuel (Diesel)	Various	AVTB : Camp Pendleton, CA	0.600	0.140	Oct 2017	0.010	Oct 2018	0.083	Oct 2019	-		0.083	0.000	0.833	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2237 / *Amphibious Vehicle Test*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Dive Team Support	C/CPFF	MCTSSA : Camp Pendleton, CA	0.150	0.152	Mar 2018	0.000	Dec 2018	0.000	Dec 2019	-		0.000	0.000	0.302	-
		Subtotal	3.655	2.725		1.531		1.654		-		1.654	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Article Ops & Main	Various	AVTB : Camp Pendelton, CA	1.433	0.186	Oct 2017	0.080	Oct 2018	0.201	Oct 2019	-		0.201	Continuing	Continuing	Continuing
Test Equipment	WR	AVTB : MCTSSA Camp Pendleton	0.315	0.251	Oct 2017	0.015	Oct 2018	0.095	Oct 2019	-		0.095	0.000	0.676	-
		Subtotal	1.748	0.437		0.095		0.296		-		0.296	Continuing	Continuing	N/A

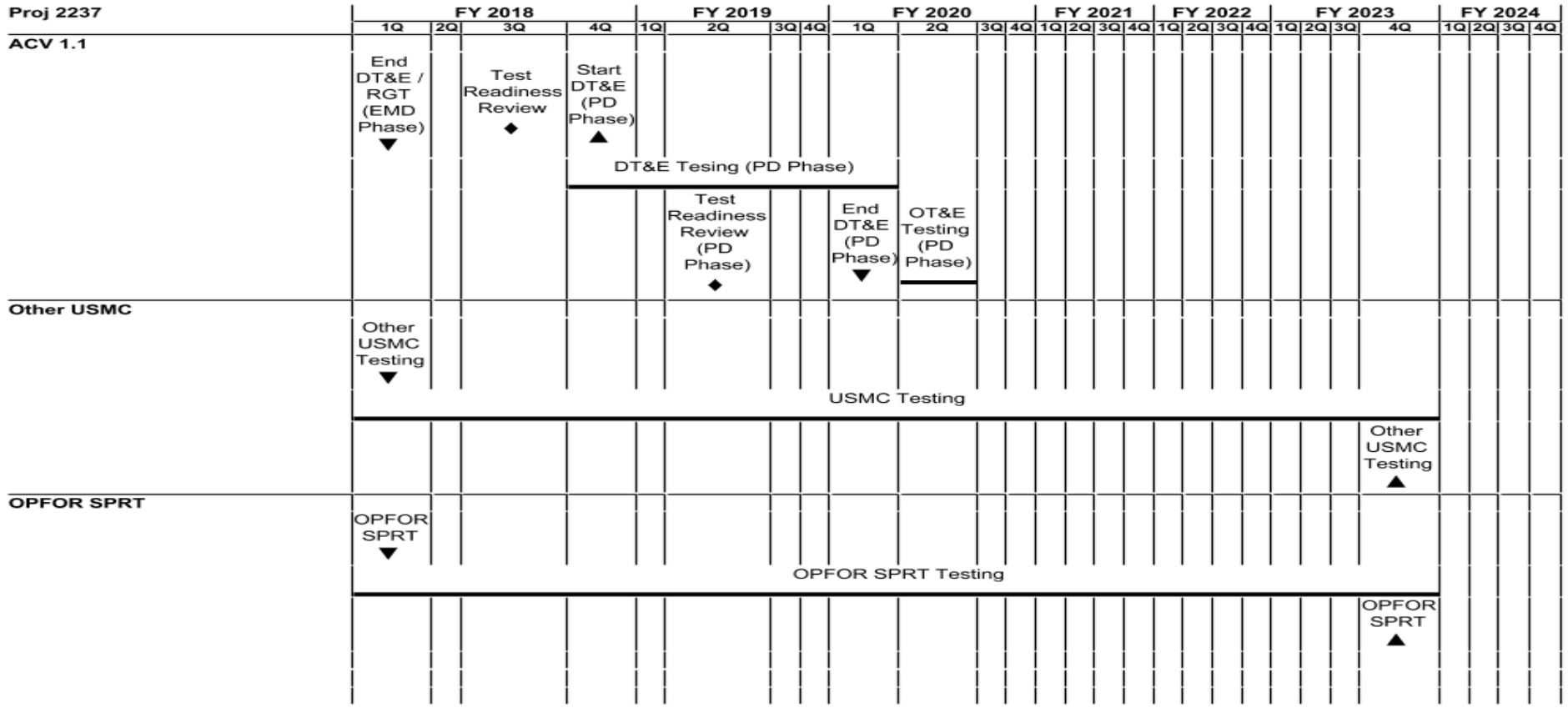
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Data Management	C/FFP	MCTSSA Camp Pendleton : Camp Pendleton	1.618	0.580	Nov 2017	0.300	Nov 2018	0.409	Nov 2019	-		0.409	Continuing	Continuing	Continuing
Lab and Tech Writer Supt.	C/FFP	MCTSSA Camp Pendleton : Camp Pendleton	0.872	0.630	Dec 2017	0.371	Nov 2018	0.461	Nov 2019	-		0.461	0.000	2.334	-
		Subtotal	2.490	1.210		0.671		0.870		-		0.870	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	10.323	4.372		2.297		2.820		-		2.820	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2237 / *Amphibious Vehicle Test*



2020OSD - 0206623M - 2237

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2237 / *Amphibious Vehicle Test*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2237				
ACV 1.1: FY18 End DT&E / RGT (EMD Phase)	1	2018	1	2018
ACV 1.1: FY18 (1) Test Readiness Review	3	2018	3	2018
ACV 1.1: FY18 Start DT&E (PD Phase)	4	2018	4	2018
ACV 1.1: FY 19 DT&E Tesing (PD Phase)	4	2018	1	2020
ACV 1.1: FY19 End DT&E (PD Phase)	1	2020	1	2020
ACV 1.1: FY19 (2) Test Readiness Review (PD Phase)	2	2019	2	2019
ACV 1.1: FY 20 OT&E Testing (PD Phase)	2	2020	2	2020
Other USMC: Other USMC Testing	1	2018	1	2018
Other USMC: USMC Testing	1	2018	4	2023
Other USMC: End of Other USMC Testing	4	2023	4	2023
OPFOR SPRT: OPFOR Support	1	2018	1	2018
OPFOR SPRT: OPFOR Support Testing	1	2018	4	2023
OPFOR SPRT: End of OPFOR Support	4	2023	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2315 / *Training Devices/Simulators*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2315: *Training Devices/ Simulators*	135.514	22.979	16.060	11.561	-	11.561	24.815	23.179	19.674	20.067	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

(U) Training simulators supported by this program element include Combined Arms Command & Control Training Upgrade System (CACCTUS), Deployable Virtual Training Environment (DVTE), Force on Force Training Systems (FoFTS), Marine Air/Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS) Enhancements, Ranges and Training Area Management (RTAM) [Formerly Range Modernization/Transformation], Supporting Arms Virtual Trainer (SAVT), Immersive Training Range Support (ITRS) [formerly Squad Immersive Training Environment (SITE)], Tactical Decision Kits, Training Support and Training Simulation Support. These training systems provide tactical weapons and decision-making skill training from entry level through MAGTF staff level. Systems will be interoperable and will allow for mission planning, mission rehearsal and concept evaluation in a valid synthetic environment with objective and timely feedback. Through live, virtual and constructive simulation, the Marine Corps will have the means to train jointly, educate, develop doctrine and tactics, formulate and assess operational plans, assess warfighting situations, and define operational requirements.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Combined Arms Command and Control Trainer Upgrade System (CACCTUS)	5.215	3.021	1.504	0.000	1.504
Articles:	-	-	-	-	-
Description: CACCTUS is a combined arms staff training system that when fully fielded will enable comprehensive Marine Corps staff, unit, and team training both at home station Combined Arms Staff Training (CAST) facilities and through Distributed training involving CAST facilities across the Marine Corps. CACCTUS is an upgrade to the USMC's CAST that provides fire support training for the Marine Air Ground Task Force (MAGTF) elements up to and including Marine Expeditionary Brigade (MEB) level. Using the system components and simulation capabilities, two dimensional (2D) and three dimensional (3D) visuals, interfaced Command, Control, Communications, Computers and Intelligence (C4I),synthetic terrain, and an After Action Review (AAR), the concept of operations for the CACCTUS system is to immerse the trainees in a realistic, scenario-driven environment to enable commands and their battle staffs to train or rehearse combined arms tactics, techniques and procedures for decision-making processes.					
FY 2019 Plans: - Continue integration of 3D viewer software. - Continue additional training system interoperability to include additional C4I devices.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue development of After Action Review (AAR) functionality. - Initiate development to retain currency of training and readiness tasks and tactics, techniques and procedures with combined arms efforts. - Complete transition to a new communications environment. - Continue development of new architecture to support maturing hardware platforms. ***FY 2020 Base Plans:*** - Continue integration of 3D viewer software. - Continue additional training system interoperability to include additional C4I devices. - Continue development of After Action Review (AAR) functionality. - Continue development to retain currency of training and readiness tasks and tactics, techniques and procedures with combined arms efforts. - Continue development of new architecture to support maturing hardware platforms. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $1.517M is due to completion of transition to new communications environment and reduced development efforts for new architecture supporting hardware platforms.					
Title: Deployable Virtual Training Environment (DVTE)	2.284	2.408	0.804	0.000	0.804
Articles:	-	-	-	-	-
Description: DVTE is a laptop Personal Computer (PC) based simulation system capable of emulating organic and supporting Infantry Battalion weapons systems and training scenarios to facilitate training and readiness based training. Its portable configuration allows Marines to train in areas where there are few options for training in garrison, aboard ship, at remote reserve locations, and deployed. DVTE training includes language and culture training, platoon and squad level tactics, employment of supporting arms, and various Recognition of Combatants (ROC) packages. DVTE is part of a Commander's "training toolkit" contributing to the building block approach to standards based training focusing on achieving an improved level of combat readiness. ***FY 2019 Plans:*** - Continue incremental DVTE network infrastructure development by focusing on capabilities identified as DVTE application enhancements in the development plan.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue the additional efforts specified under the DVTE Software Capability Development Document (CDD) Increment II for Virtual Battlespace (VBS) release that includes improved Call For Fire (CFF) and Close Air Support (CAS) capability and Combined Arms Planning Enhancements (CAPE) to replace/decrease actual live training events. - Continue development of Tactical Air Control Party Green Gear modeling and Digital Fire Control System (DFCS) modeling for the Virtual Battlespace (VBS) release. - Continue to improve Flight Dynamics of Close Air Support (CAS) weapon platforms to more accurately represent live Joint Terminal Attack Controller (JTAC) training for the Virtual Battlespace (VBS) release. - Continue enhancement and integration of Comm Gear and After Action Review (AAR) for the Virtual Battlespace (VBS) release. - Continue enhancements to Combined Arms Planning functionality that will improve the DVTE system ability to replace live events.					
FY 2020 Base Plans: - Continue incremental DVTE network infrastructure development by focusing on capabilities identified as DVTE application enhancements in the development plan. - Continue the additional efforts specified under the DVTE Software Capability Development Document (CDD) Increment II for Virtual Battlespace (VBS) release that includes improved Call For Fire (CFF) and Close Air Support (CAS) capability and Combined Arms Planning Enhancements (CAPE) to replace/decrease actual live training events. - Continue development of Tactical Air Control Party Green Gear modeling and Digital Fire Control System (DFCS) modeling for the Virtual Battlespace (VBS) release. - Continue to improve Flight Dynamics of Close Air Support (CAS) weapon platforms to more accurately represent live Joint Terminal Attack Controller (JTAC) training for the Virtual Battlespace (VBS) release. - Continue enhancement and integration of Comm Gear and After Action Review (AAR) for the Virtual Battlespace (VBS) release. - Complete enhancements to Combined Arms Planning functionality that will improve the DVTE system ability to replace live events.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Decrease of $1.604M is due to reduced scope of enhancement and integration of Comm Gear and After Action Review (AAR) for the Virtual Battlespace (VBS).					
Title: Force on Force Training Systems (FoFTS)	1.836	4.182	1.635	0.000	1.635
Articles:	-	-	-	-	-
Description: FoFTS provides realistic, non-live-fire capabilities to perform force-on-force training and supports realistic, live-fire force-on-target training. The program develops, fields, and supports for a suite of tactical engagement systems that allow Marines to receive feedback in non-live fire FOF training by using low velocity projectiles or advanced, instrumented, laser-based tactical engagement systems. ***FY 2019 Plans:*** - Continue the Combat Vehicle-Tactical Engagement Simulation System (CV-TESS) development for the integration of the LAV-25, LAV-AT and M1A1 simulators. - Continue MFST JTAC task enhancements. - Initiate development of the close combat instrumentation for the Instrumented Tactical Engagement Simulation system (I-TESS) III training system with a limited user evolution of new technologies to meet the urban training requirements for within 10 m range engagements. This will support the integration of the MFST into the I-TESS III environment developing technology to allow for freedom of movement throughout the training area. These three areas of development will support the future objectives for I-TESS III by expanding the training radius, allowing for close combat effective training and augmented reality throughout the training area. - Initiate development of a Long Term Evolution (LTE) wireless data communications network to support the Force on Force Next data backbone. The $2.346M increase from FY18 to FY19 provided additional capabilities to test out the expanded Long Term Evolution (LTE) wireless data communication network for Range 220 (29 Palms, CA) large scale exercises with communications back haul. ***FY 2020 Base Plans:*** - Continue the Combat Vehicle-Tactical Engagement Simulation System (CV-TESS) development for the integration of the LAV-25, LAV-AT and M1A1 simulators. - Continue MFST JTAC task enhancements. - Continue development of the close combat instrumentation for the I-TESS III training system with a limited user evolution of new technologies to meet the urban training requirements for within 10m range engagements. This will support the integration of the Mobile Fire Support Trainer (MFST) into the I-TESS III environment developing					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
technology to allow for freedom of movement throughout the training area. These three areas of development will support the future objectives for I-TESS III by expanding the training radius, allowing for close combat effective training and augmented reality throughout the training area. - Continue development of a Long Term Evolution (LTE) wireless data communications network to support the Force on Force Next data backbone. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $2.547M decrease from FY19 to FY20 is due to the test completion of the expanded Long Term Evolution (LTE) wireless data communication network for Range 220 (29 Palms, CA) large scale exercises with communications back haul.					
Title: Marine Air/Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS) Enhancements	7.447	2.995	1.156	0.000	1.156
Articles:	-	-	-	-	-
Description: The MAGTF Tactical Warfare Simulation (MTWS) is the Marine Corps' only constructive, aggregate-level simulation system used to support the training of Marine commanders and their battle staffs in MAGTF war-fighting principles/concepts and associated command and control procedures. Using complex computer-simulated behavior models, MTWS provides an interactive, decision-based, real-time, war game representing the six war-fighting functional areas of fires, command and control, force protection, logistics, maneuver, and intelligence. It's modeling breadth and flexibility enables users to represent and exercise a wide variety of combat scenarios to prepare leaders to face the military challenges of today's world. MTWS is designed to support the training of commanders and their staffs in exercises involving live and simulated land, air, and naval forces at all operational command levels. The system supports all levels of command throughout the Marine Expeditionary Force (MEF) and Joint Task Force (JTF). MTWS can be used as a multi-sided war game, including red, blue, civilian, and non-aligned sides. The system can also be used to validate specific operational plans against a variety of enemy and environmental situations. Thus command personnel may examine alternative tactical solutions on a "what if" basis. ***FY 2019 Plans:*** - Complete development to increase levels of software capability. - Continue to develop new software capabilities to meet changing operational environments. - Continue development of Joint Live, Virtual and Constructive (JLVC) federation capabilities.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue JLVC Federation annual minor release. - Continue effort to re-engineer the MTWS software baseline. ***FY 2020 Base Plans:*** - Complete JLVC Federation annual minor release. - Continue to develop new software capabilities to meet changing operational environment. - Continue to develop Joint Live, Virtual and Constructive (JLVC) Federation capabilities. - Continue effort to re-engineer the MTWS software baseline. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $1.839M is due to the reduced development efforts of the current software capability.					
Title: Ranges and Training Area Management (RTAM)	1.057	1.068	4.119	0.000	4.119
Articles:	-	-	-	-	-
Description: Ranges and Training Area Management (RTAM) developments are associated with modernizing live training ranges at major USMC bases and stations. This development effort enhances After Action Review (AAR) with ground truth feedback, realistic representation of Opposing Forces (OPFOR), and will upgrade the range and exercise control capabilities. RTAM integrates Live, Virtual, and Constructive training technologies, thereby, enhancing fielded live-fire, force-on-target, and force-on-force training capabilities. ***FY 2019 Plans:*** - Continue to perform minimum software upgrades to add capability to the Range Instrumentation Systems Exercise Controller (RISCon) through the integration of numerous live/target systems. - Continue enhancements of TRACR software for Friend-and-Foe target control and scenario development, to include integration with Range Instrumentation System Controller (RISCon). - Continue the Tactical Video Capture System (TVCS) Mobile (RISCon) enhancements. ***FY 2020 Base Plans:*** - Continue to perform minimum software upgrades to add capability to the Range Instrumentation Systems Exercise Controller (RISCon) through the integration of numerous live/target systems. - Continue enhancements of TRACR software for Friend-and-Foe target control and scenario development, to include integration with Range Instrumentation System Controller (RISCon).					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue enhancements of the Tactical Video Capture System (TVCS) Mobile (RISCon). - Initiate enhancements of TRACR and RISCon-T software for Friend-and-Foe target control and scenario development integration with Location of Miss and Hit (LOMAH) capabilities. - Initiate development of Live-fire, shoot back interactive target capabilities. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $3.051M increase from FY19 to FY20 supports integration with Location of Miss and Hit (LOMAH) capabilities and the development of Live-fire, shoot back interactive target capabilities.					
Title: Supporting Arms Virtual Trainer (SAVT) ***Articles:*** ***Description:*** The SAVT will advance the training capability, operational readiness, and tactical proficiency of USMC Joint Terminal Attack Controllers (JTACS), Forward Observers (FOs), and Forward Air Controllers (FACs). The personnel will use training scenarios that require the placement of tactical ordnance on selected targets using Joint Close Air Support (JCAS) procedures and observed fire procedures for Naval Surface Fire Support (NSFS),artillery and mortar fire to perform destruction, neutralization, suppression, illumination/coordinated illumination, interdiction and harassment fire missions. ***FY 2019 Plans:*** - Utilize FY18 RDTE in FY19 to initiate and complete Information Assurance and networkability in order to interoperate with other Simulations in Live Virtual Constructive (LVC). ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	2.115 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: Immersive Training Range Support (ITRS) [formerly Squad Immersive Training Environment (SITE)] ***Articles:***	2.716 -	2.386 -	1.995 -	0.000 -	1.995 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: The Immersive Training Range Support (ITRS) [formerly Squad Immersive Training Environment (SITE)] is an integrating construct or "toolkit" of Live, Virtual and Constructive (LVC) training capabilities used to significantly improve infantry squad operational readiness and squad leader tactical decision-making skills. The collection of LVC training capabilities within SITE will enhance opportunities for squad collective training to increase tactical proficiency, confidence, and readiness for real world operations. SITE will enhance skill transfer and assessment by enabling squads to finish, test, and remediate training in preparation for a capstone exercise such as pre-deployment training. ***FY 2019 Plans:*** - Continue to produce additional documentation associated with product development to include (1) Systems Design Specification; (2) Interface Design Document; and (3) an overarching System Engineering Master Plan (SEMP) crossing current training systems to steer development of standards and a roadmap for system capability upgrades and sustained interoperability. - Complete virtual integration tasks for CCS, SAVT, DVTE gateways and database commonality. ***FY 2020 Base Plans:*** - Continue to produce additional documentation associated with product development to include (1) Systems Design Specification; (2) Interface Design Document; and (3) an overarching System Engineering Master Plan (SEMP) crossing current training systems to steer development of standards and a roadmap for system capability upgrades and sustained interoperability. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $0.391M decrease from FY19 to FY20 is due to the completion of the virtual integration tasks.					
Title: Training Support	0.309	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Provide training solution development efforts for the modernization of training systems by providing high fidelity, immersive simulations and capabilities. Integrates existing live, virtual, and constructive training capabilities to provide fully coordinated Marine Air Ground Training Force (MAGTF) training exercises that realistically simulate the operating environment.					
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Training Simulation Support ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** - Initiate integration of the Marine Air/Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS) into the Joint Live, Virtual and Constructive Federation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 increase is to integrate Marine Air/Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS) into the Joint Live, Virtual and Constructive Federation.	0.000 -	0.000 -	0.348 -	0.000 -	0.348 -
Accomplishments/Planned Programs Subtotals	22.979	16.060	11.561	0.000	11.561

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/6532-01: *Training Devices, CACCTUS*	3.671	2.909	3.715	-	3.715	4.992	4.498	4.231	10.598	Continuing	Continuing
• PMC/6532-02: *Training Devices, RTAM*	16.646	22.476	28.022	-	28.022	26.507	25.326	27.868	33.720	Continuing	Continuing
• PMC/6532-03: *Training Devices, SAVT*	4.212	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.631
• PMC/6532-04: *Training Devices, DVTE*	1.072	0.947	1.437	-	1.437	4.479	4.294	4.241	4.326	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/6532-05: *Training Devices, Force on Force Training Systems*	16.335	20.942	53.749	-	53.749	61.175	58.968	9.518	23.399	Continuing	Continuing
• PMC/6532-06: *Training Devices, Immersive Training Range Support/SITE*	18.759	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	18.759
• PMC/6532-07: *Training Devices, MTWS*	0.426	0.752	0.619	-	0.619	0.867	0.853	0.811	0.827	Continuing	Continuing

Remarks

FoFTS FY24 PMC includes $13.851M for the Guam Initiative.

D. Acquisition Strategy

(U) CACCTUS - MIPRs to Army and exercise task orders via IDIQ contract.
(U) DVTE - Exercise task orders off of IDIQ contract for Virtual Battleship Space (VBS) Software (SW) Development.
(U) MTWS - Exercise task orders for Software Development and Re-engineering efforts via IDIQ contract.
(U) RTAM - MIPR to the Army-PEO STRI planned for award on existing Consolidated Product-line Management Contract.
(U) SAVT - New competitive (C/FFP) contract supporting the Joint Terminal Attack Controller (JTAC) Memorandum of Agreement (MOA) awarding Base contract in December 2017 and awarding task order to support this effort in Mar 2018.
(U) Immersive Training Range Support (formerly SITE) - MIPR to the Army-PEO STRI planned for award on existing Consolidated Product-line Management Contract.
(U) Training Support - Extended existing contract 9 months in order to continue activities in support of federate status with the Joint Live Virtual Constructive (JLVC) federation v.8, and complete in-process enhancements forUlchi Freedom Guardian-15 (UFG-15); Exercise task order on new competitive contract (C-IDIQ).
(U) FoFTS - MIPR to Army-PEO STRI for award on existing Consolidated Product-line Management contract; New competitive I-TESS-III award planned for August 2019.
(U) Tactical Decision Kits - awarded prime contract to Tuva, LLC, Herndon, VA.
(U) Training Simulation Support - competitive contract award for integration of Marine Air/Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS) system into the Joint Live, Virtual, Constructive (JLVC) federation.

E. Performance Metrics

Program Management Reviews are conducted on all PM TRASYS programs on a quarterly basis to assess program status.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2315 / *Training Devices/Simulators*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CACCTUS - SW Dev TO 3	C/IDIQ	Riptide Software, Inc. : Oviedo, FL	0.554	1.408	Jan 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
CACCTUS - SW Dev TO 4	C/IDIQ	Riptide Software, Inc. : Oviedo, FL	0.596	3.646	Aug 2018	1.700	May 2019	0.000		-		0.000	0.000	5.942	-
CACCTUS - SW Dev TO 5	C/IDIQ	Riptide Software, Inc. : Oviedo, FL	0.739	0.161	Apr 2018	1.321	May 2019	0.000		-		0.000	0.000	2.221	-
CACCTUS - SW Dev TO 6	C/IDIQ	Riptide Software, Inc. : Orlando, FL	0.000	0.000		0.000		1.504	Jun 2020	-		1.504	0.000	1.504	-
DVTE - SW Dev - VBS	SS/IDIQ	Bohemia Interactive : Orlando, FL	13.813	2.284	May 2018	2.408	May 2019	0.804	Apr 2020	-		0.804	Continuing	Continuing	Continuing
Tactical Decision Kit	C/FFP	Tuva : Herndon, VA	7.200	0.000		0.000		0.000		-		0.000	0.000	7.200	-
MTWS - SW Dev Task 2	C/IDIQ	Cole Engineering Services Inc. : Orlando, FL	2.294	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MTWS - SW Dev Task 3	C/IDIQ	Cole Engineering Services Inc. : Orlando, FL	0.150	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MTWS - SW Dev Task 4	C/IDDQ	Cole Engineering Services Inc. : Orlando, FL	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
MTWS - SW Dev Task 5	C/IDIQ	Cole Engineering Services Inc. : Orlando, FL	0.097	0.000		0.000		0.000		-		0.000	0.000	0.097	-
MTWS - SW Dev Task 6	C/IDIQ	Cole Engineering Services Inc. : Orlando, FL	0.948	0.000		0.000		0.000		-		0.000	0.000	0.948	-
MTWS - SW Dev Task 7	C/IDIQ	Cole Engineering Services Inc. : Orlando, FL	2.217	0.000		0.000		0.000		-		0.000	0.000	2.217	-
MTWS - SW Dev Task 8	C/IDIQ	Cole Engineering Services Inc. : Orlando, FL	0.552	0.000		0.000		0.000		-		0.000	0.000	0.552	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2315 / *Training Devices/Simulators*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MTWS - Reengineering	C/IDIQ	RECOMPETE : TBD NEW VENDOR	0.000	5.221	Jun 2018	2.995	Aug 2019	1.156	Feb 2020	-		1.156	0.000	9.372	-
MTWS - SWDev Task 9	C/IDIQ	Cole Engineering, Inc. : Orlando, FL	0.000	0.932	Jul 2018	0.000		0.000		-		0.000	0.000	0.932	-
MTWS - SWDev Task 10	C/IDIQ	Cole Engineering, Inc. : Orlando, FL	0.000	0.382	Jun 2018	0.000		0.000		-		0.000	0.000	0.382	-
MTWS - SWDev Task 11	C/IDIQ	Cole Engineering, Inc. : Orlando, FL	0.000	0.912	Mar 2018	0.000		0.000		-		0.000	0.000	0.912	-
RTAM RISCon Development	MIPR	PEOSTRI/TRADE : Orlando, FL	8.359	1.057	Dec 2017	1.068	Jul 2019	4.119	Dec 2019	-		4.119	Continuing	Continuing	Continuing
SAVT - Tech Insertion	C/FFP	Riptide Software, Inc. : Orlando, FL	0.000	2.115	Mar 2019	0.000		0.000		-		0.000	0.000	2.115	-
ITRS (SITE) - Live Core System Upgrades	C/FFP	Cubic Defense : San Diego, CA	3.563	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
ITRS (SITE) - Consolidated Product Line Dev	MIPR	PEOSTRI/TRADE : Orlando, FL	5.574	2.687	Dec 2017	2.361	Jul 2019	1.995	Dec 2019	-		1.995	Continuing	Continuing	Continuing
Training Support - MTWS - SW Dev Task 2	C/IDIQ	Cole Engineering Services Inc. : Orlando, FL	0.294	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Training Support - LVC-TE AoA	FFRDC	NAVSEA : Washington, DC	0.675	0.309	Jul 2018	0.000		0.000		-		0.000	0.000	0.984	-
Training Simulation Support	C/IDIQ	TBD : TBD	0.000	0.000		0.000		0.348	Jun 2020	-		0.348	0.000	0.348	-
FoFTS SW Development	MIPR	PEOSTRI/TRADE : Orlando, FL	0.000	1.836	Apr 2018	4.182	Jul 2019	1.635	Jul 2020	-		1.635	0.000	7.653	-
Prior Year Cumulative Funding	Various	Not Specified : Not Specified	71.995	0.000		0.000		0.000		-		0.000	0.000	71.995	-
		Subtotal	119.620	22.950		16.035		11.561		-		11.561	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ITRS (SITE) - Travel	Various	DTS : Various	0.095	0.029	Sep 2018	0.025	Sep 2019	0.000		-		0.000	0.000	0.149	-
Prior Year Cumulative Funding	Various	Not Specified : Not Specified	15.797	0.000		0.000		0.000		-		0.000	0.000	15.797	-
		Subtotal	15.892	0.029		0.025		0.000		-		0.000	0.000	15.946	N/A

Test and Evaluation ($ in Millions)

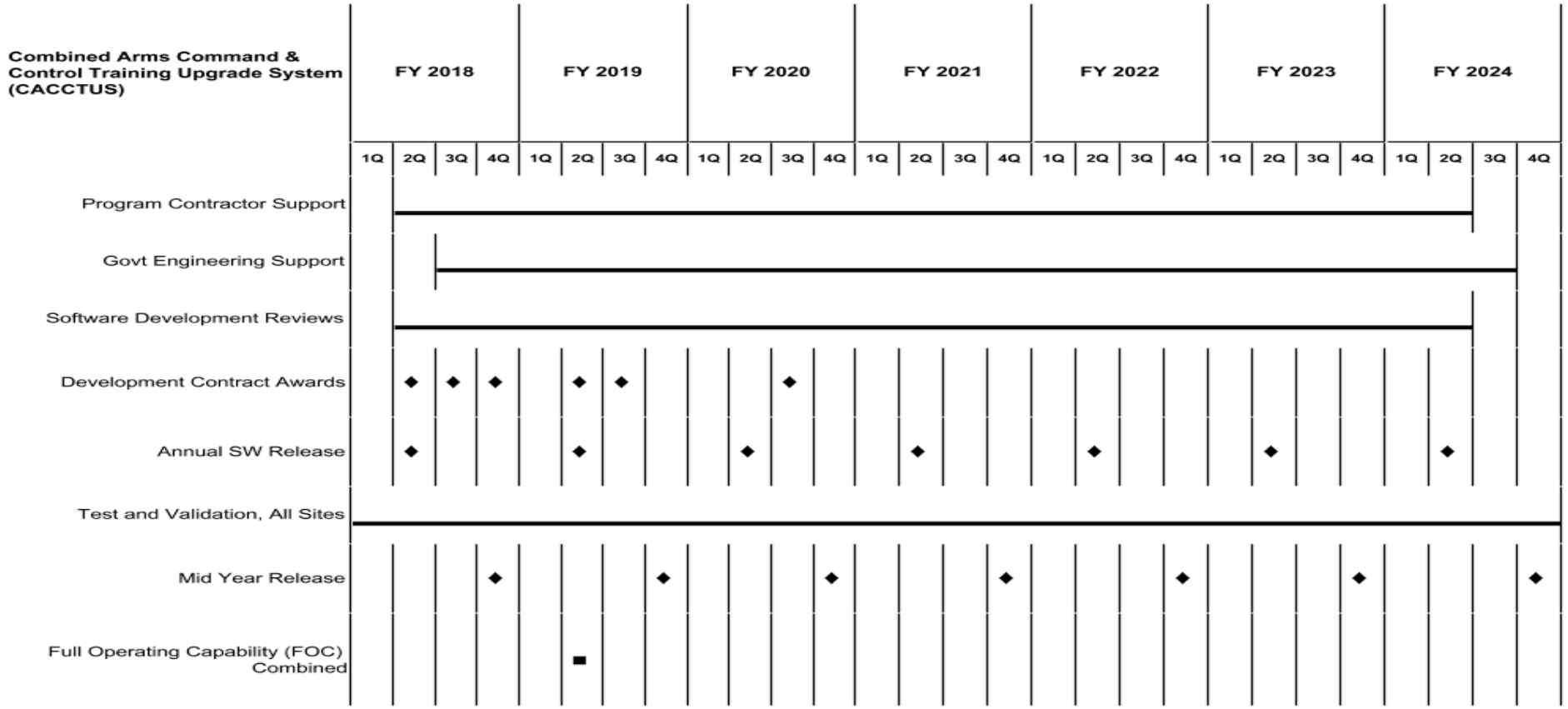
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Cumulative Funding	Various	Not Specified : Not Specified	0.002	0.000		0.000		0.000		-		0.000	0.000	0.002	-
		Subtotal	0.002	0.000		0.000		0.000		-		0.000	0.000	0.002	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	135.514	22.979		16.060		11.561		-		11.561	Continuing	Continuing	N/A

Remarks

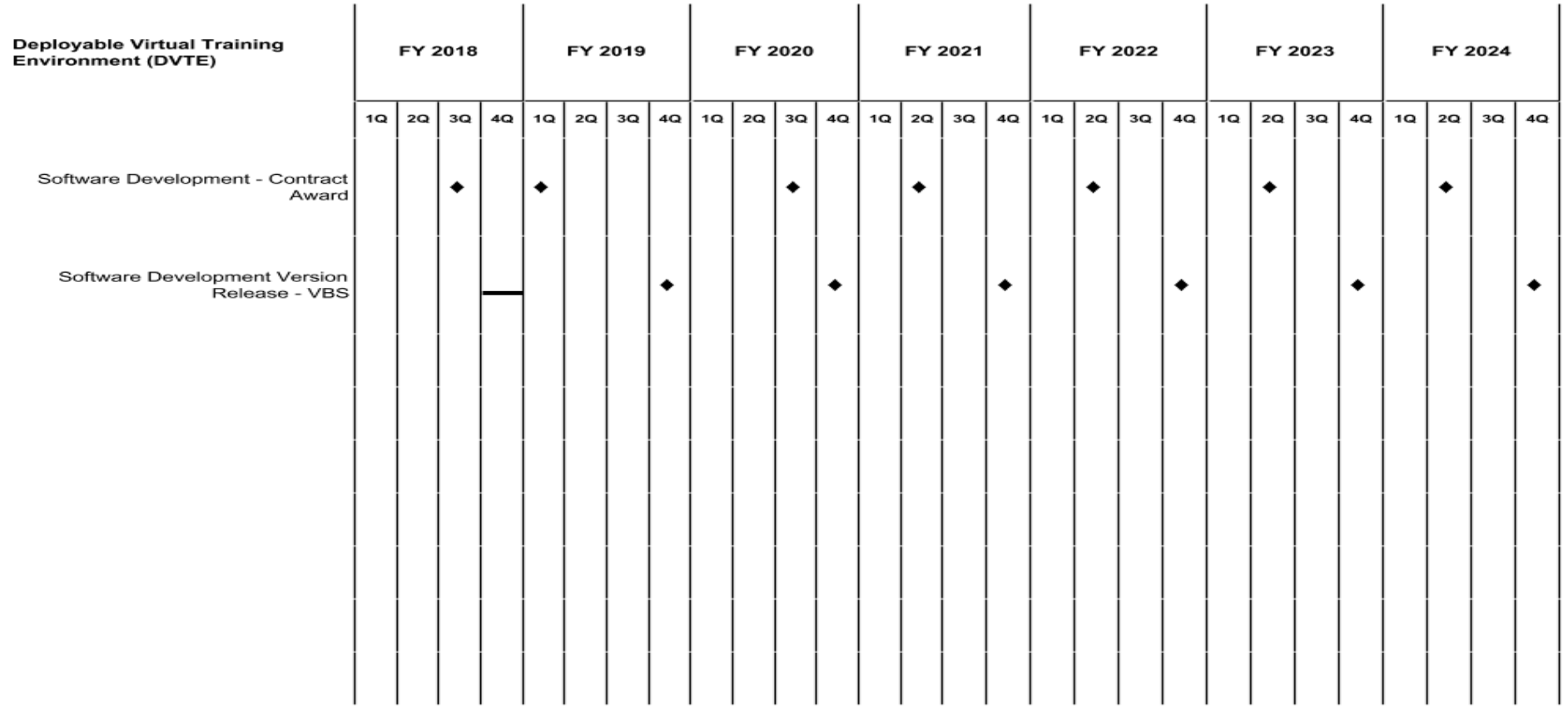
Decrease from FY19 to FY20 reflects programs moving through their acquisition lifecycle.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



2020DON - 0206623M - 2315

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



2020DON - 0206623M - 2315

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

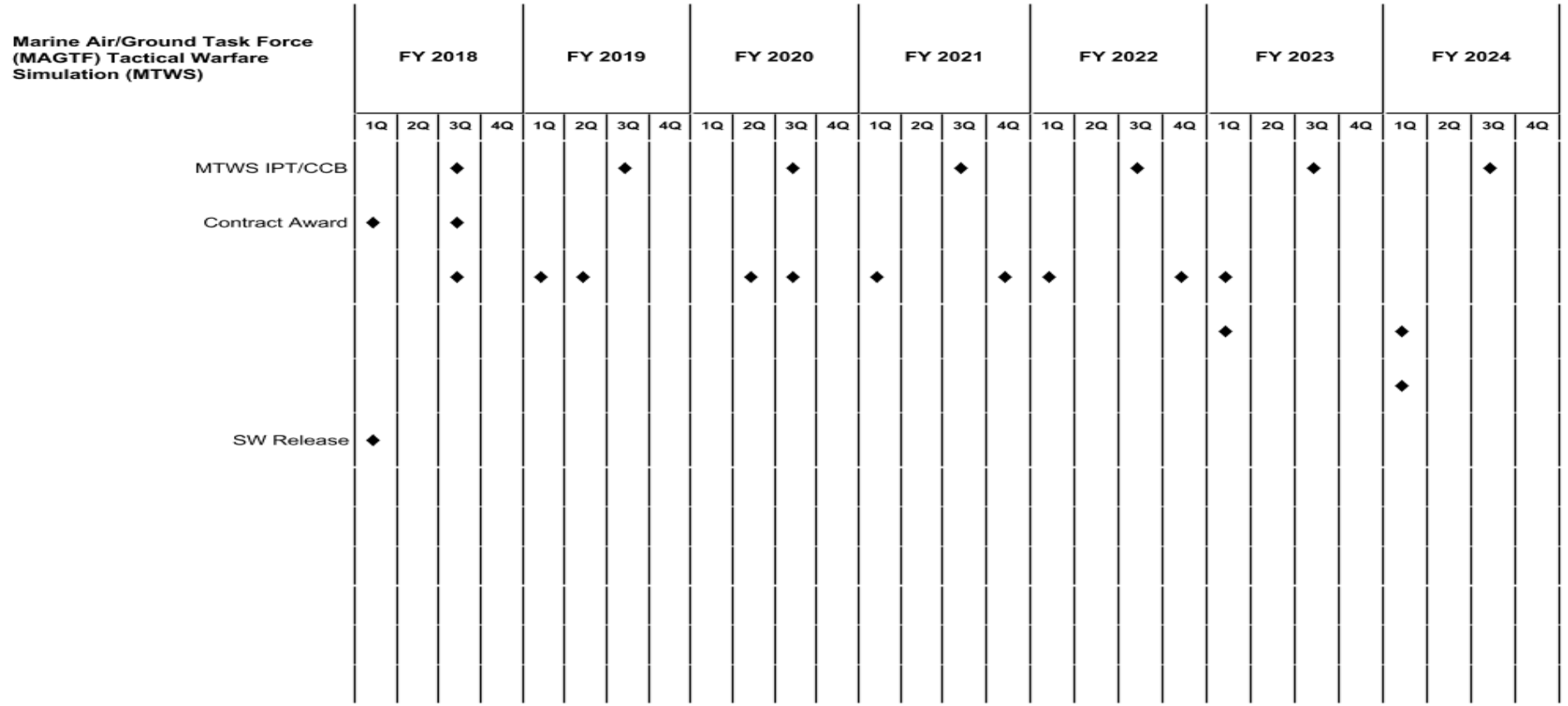


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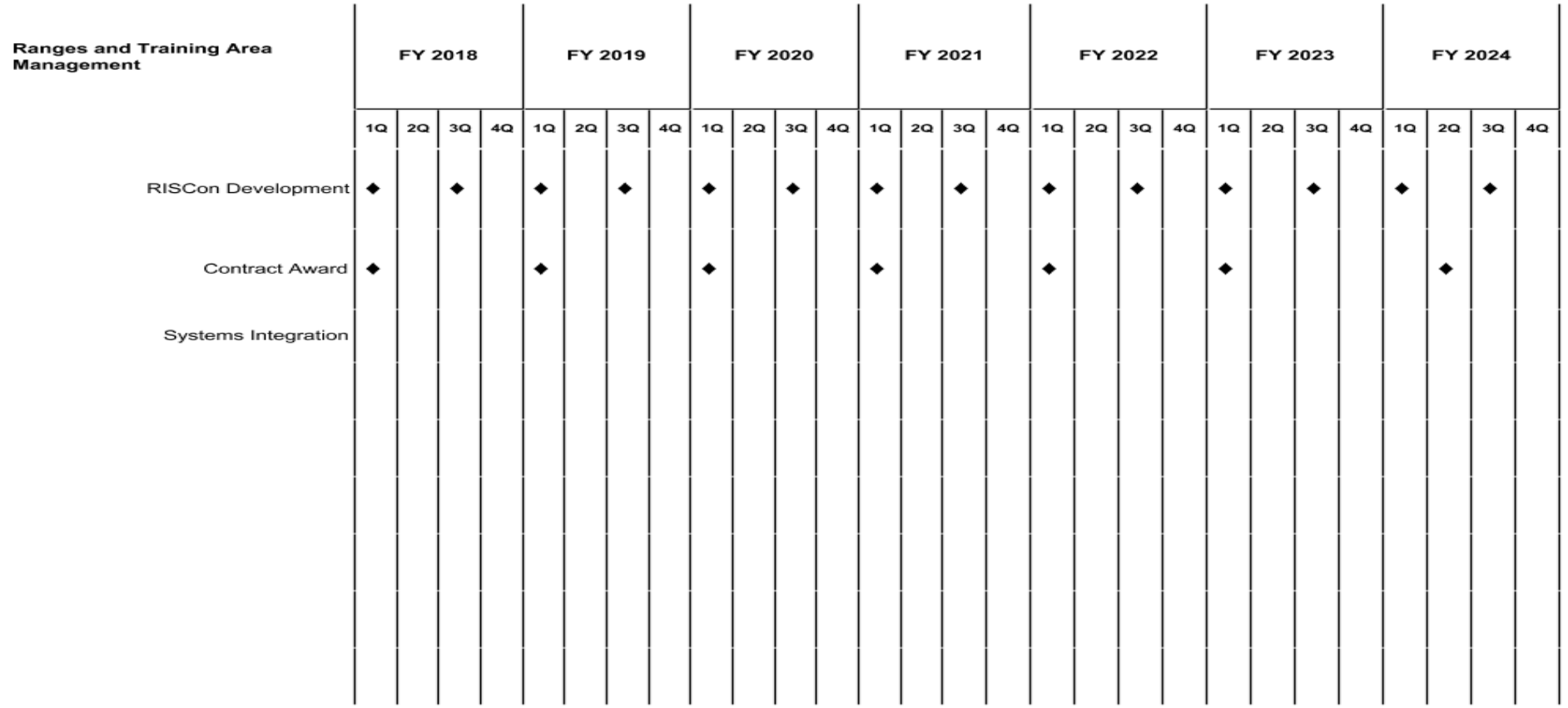
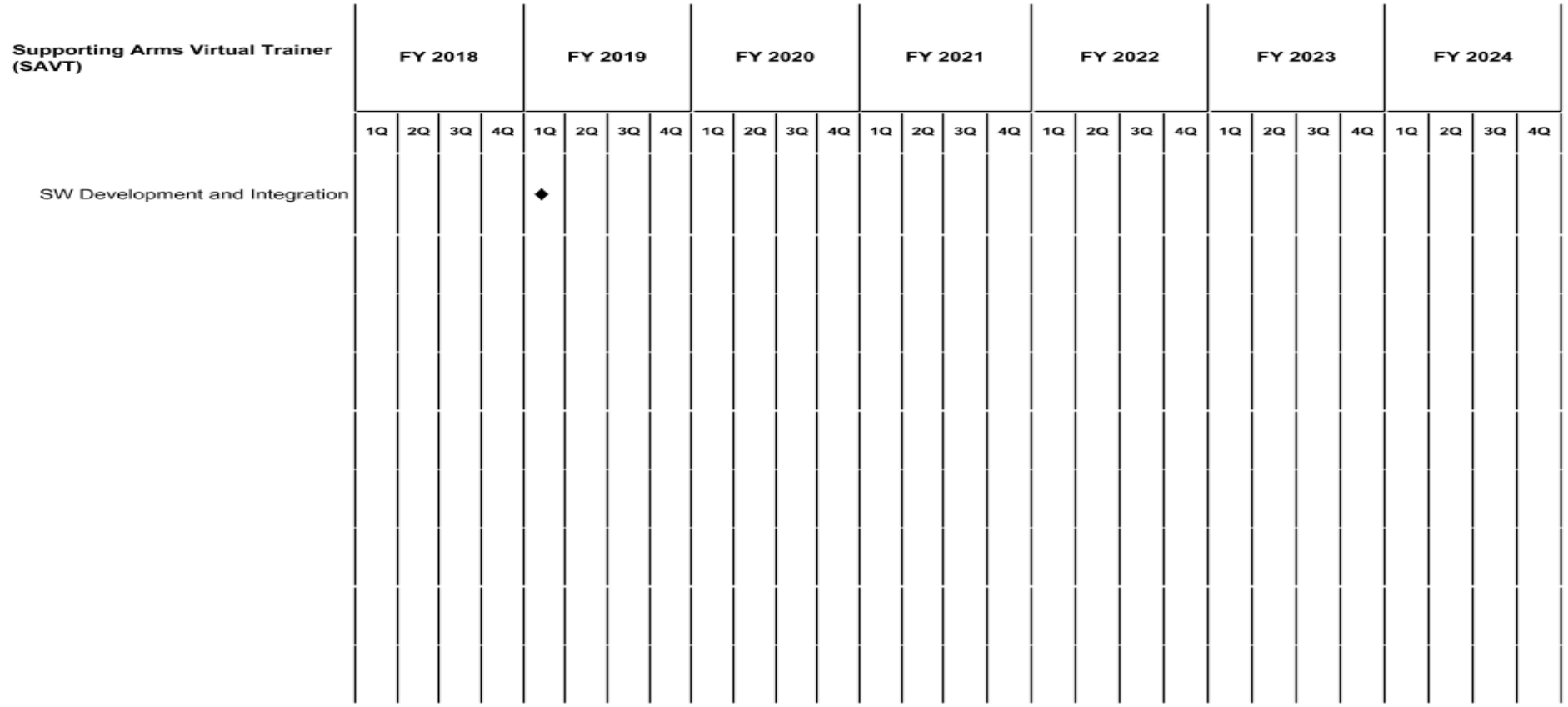
Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



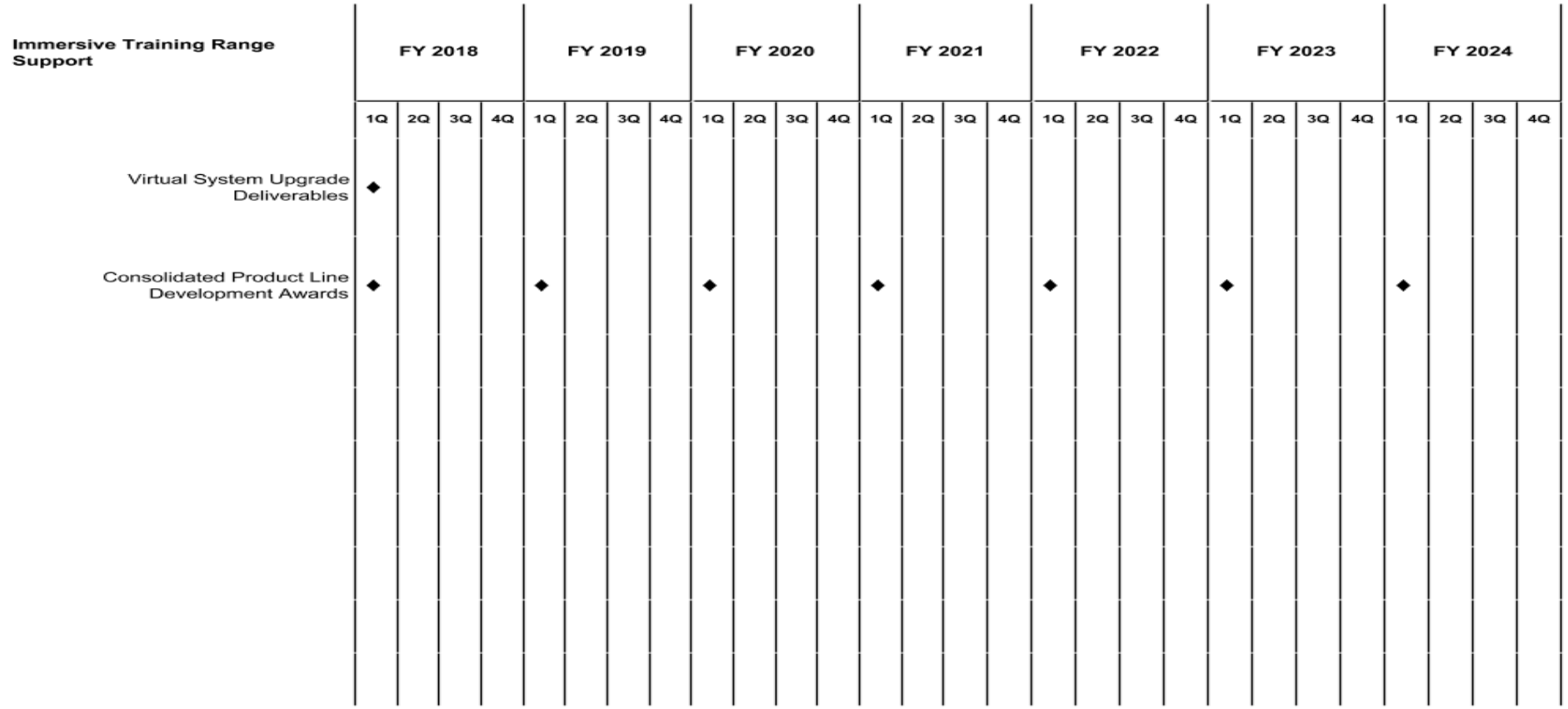
2020DON - 0206623M - 2315

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



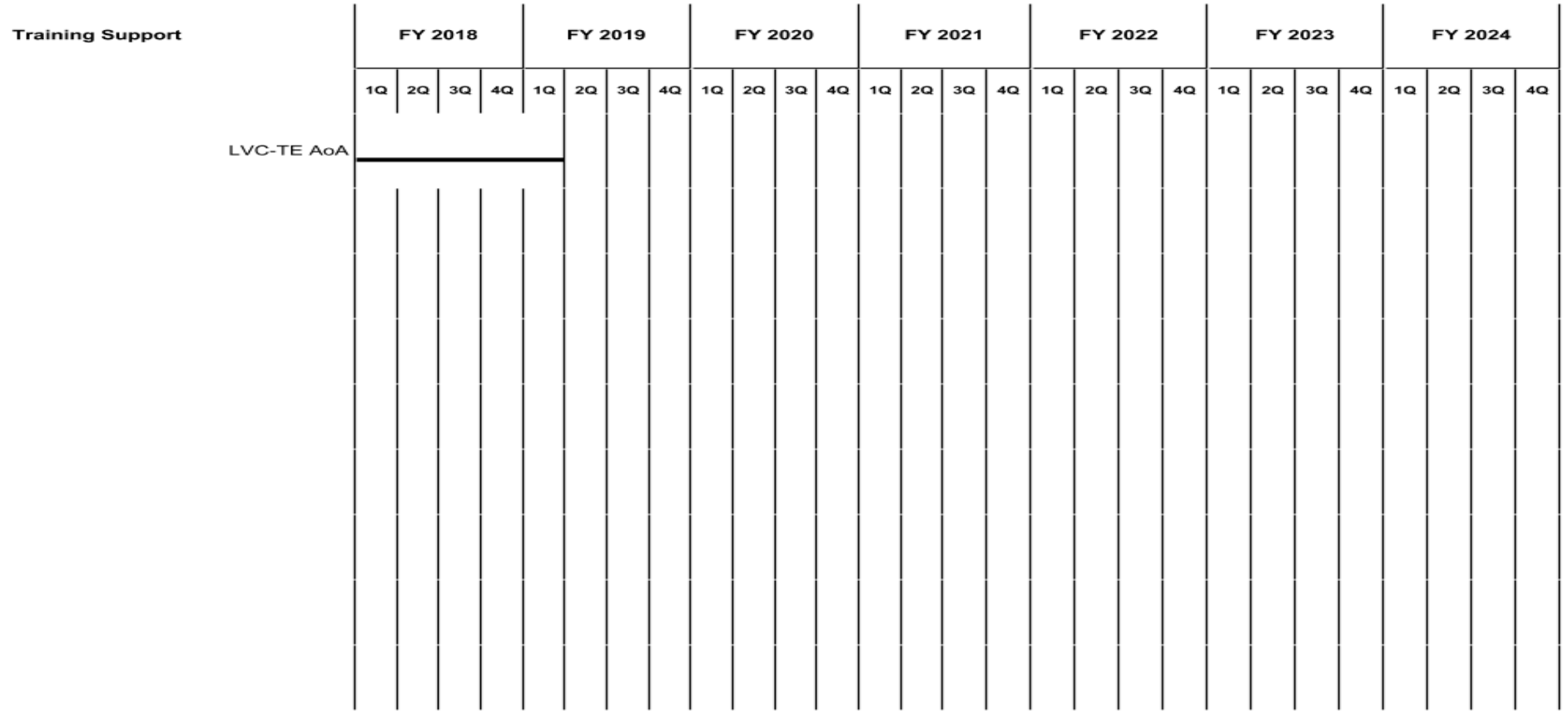
2020DON - 0206623M - 2315

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



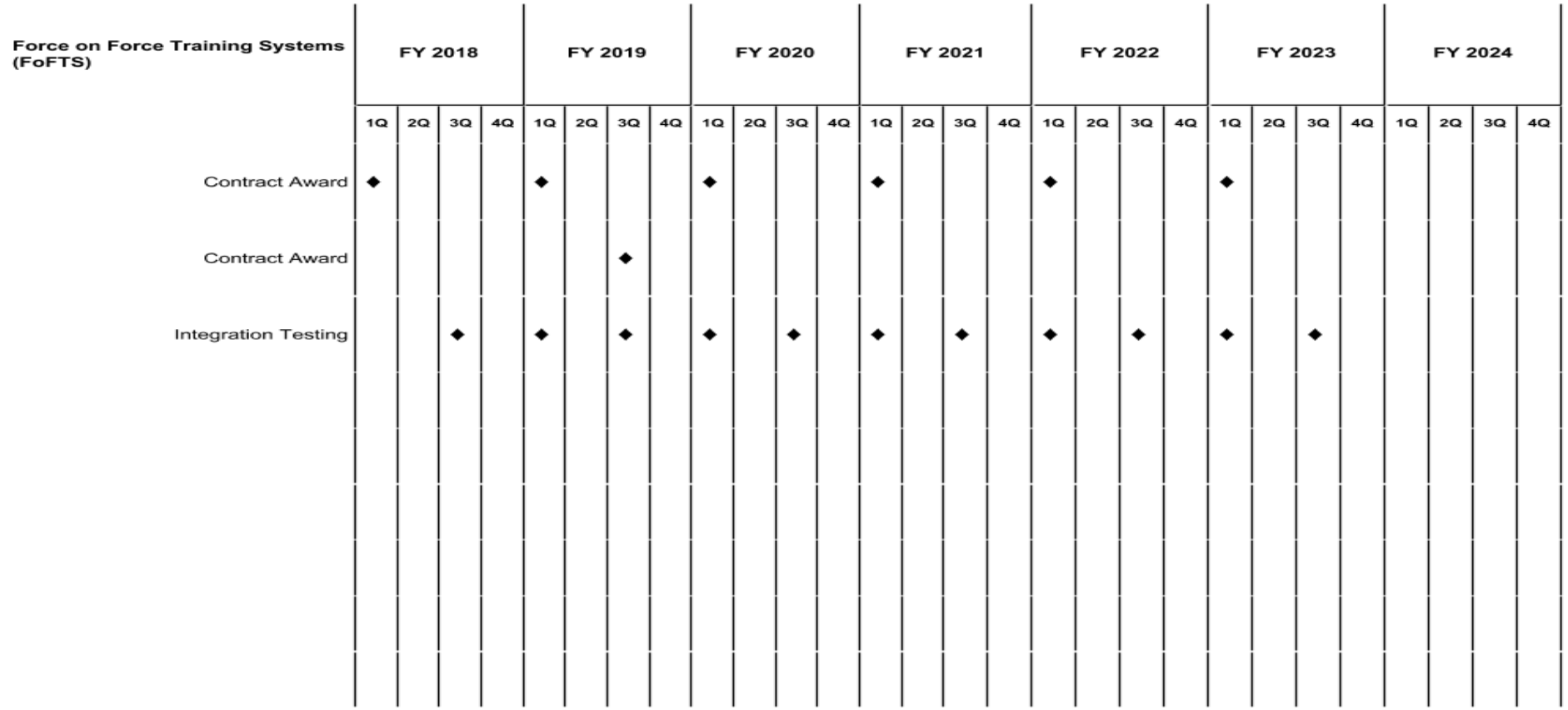
2020DON - 0206623M - 2315

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



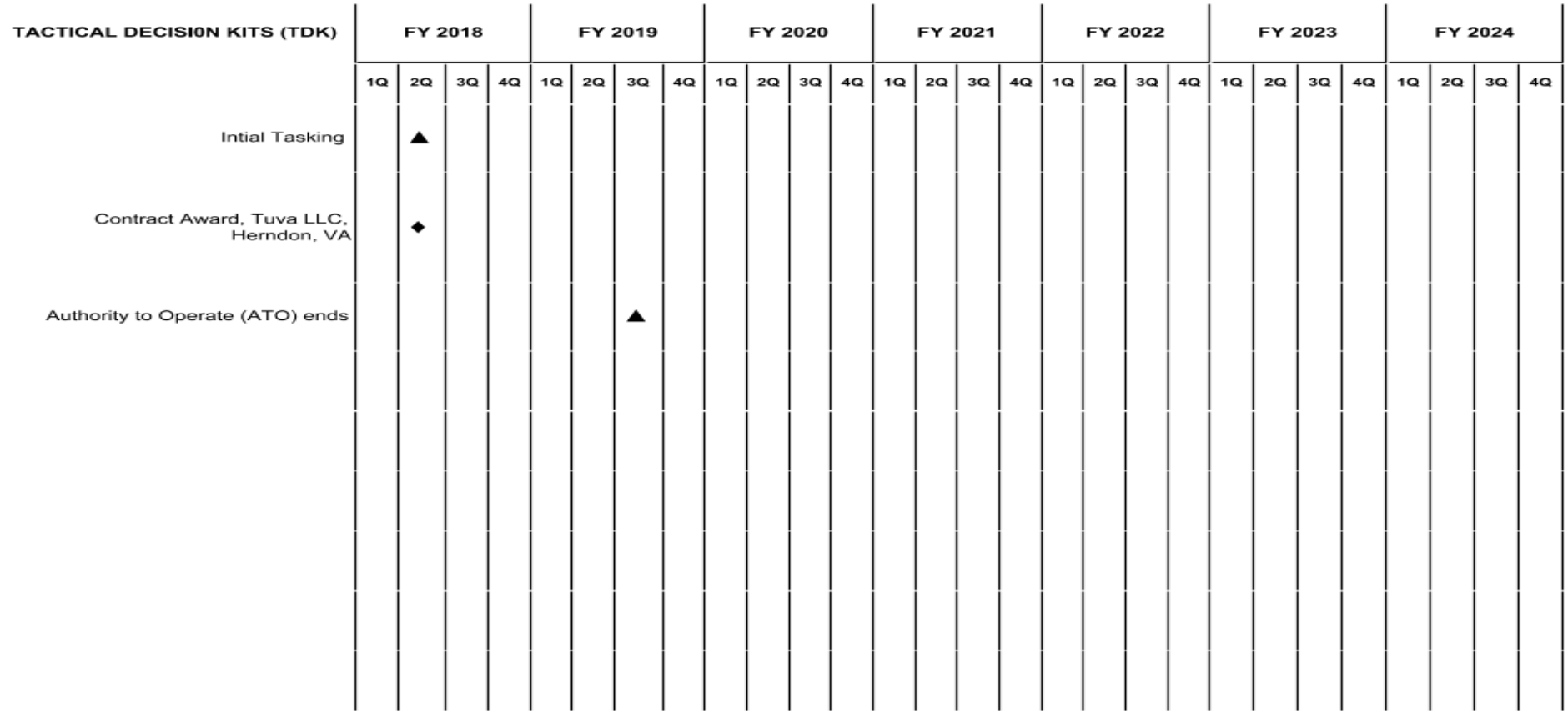
2020DON - 0206623M - 2315

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



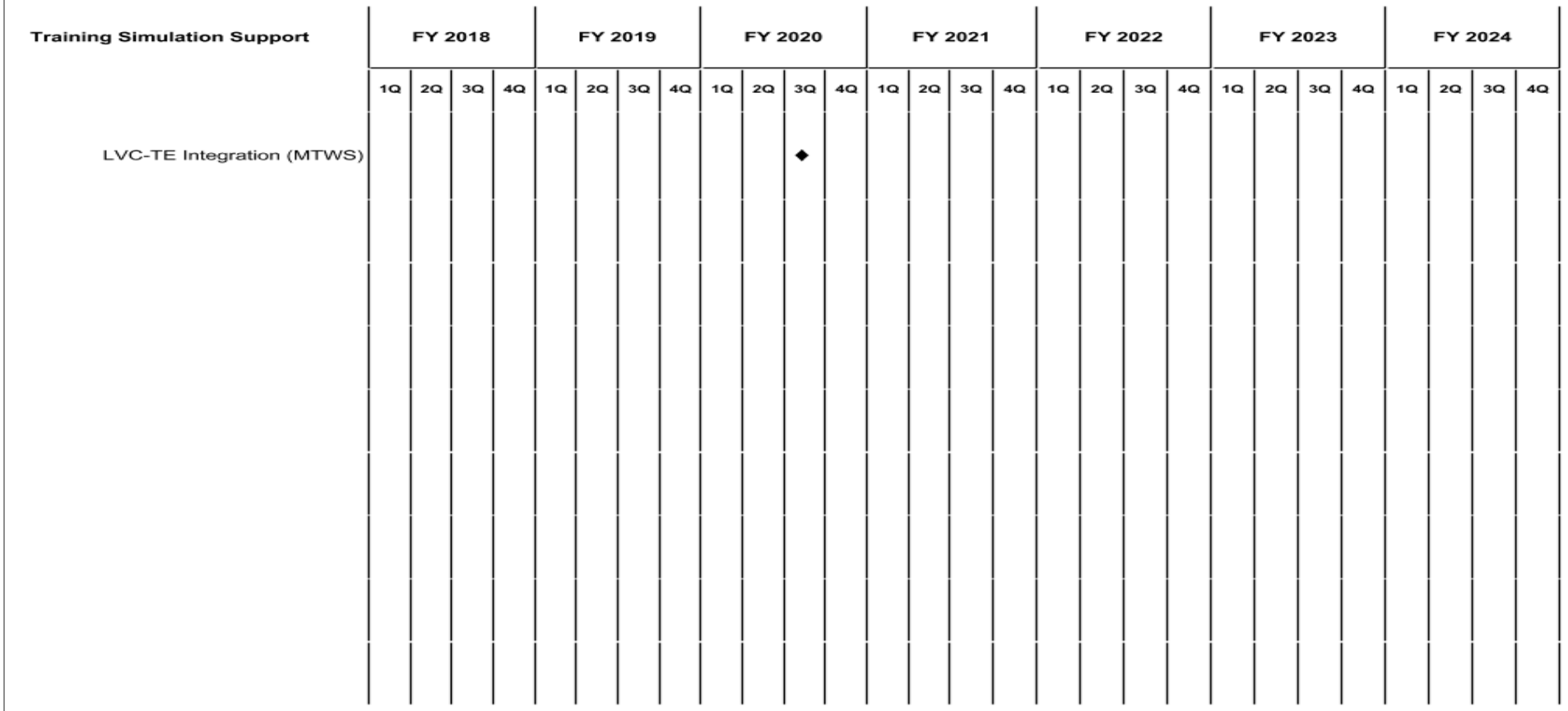
2020DON - 0206623M - 2315

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



2020DON - 0206623M - 2315

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*



2020DON - 0206623M - 2315

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Combined Arms Command & Control Training Upgrade System (CACCTUS)				
Program Contractor Support: Program Contractor Support	2	2018	2	2024
Govt Engineering Support: Govt Engineering Support	3	2018	3	2024
Software Development Reviews: Software Development Reviews	2	2018	2	2024
Development Contract Awards: FY18 Award 3	2	2018	2	2018
Development Contract Awards: FY18 Award 4	4	2018	4	2018
Development Contract Awards: FY18 Award 5	3	2018	3	2018
Development Contract Awards: FY19 Award 4	3	2019	3	2019
Development Contract Awards: FY19 Award 5	2	2019	2	2019
Development Contract Awards: FY20 Award 6	3	2020	3	2020
Annual SW Release: Annual SW Release 2018	2	2018	2	2018
Annual SW Release: Annual SW Release 2019	2	2019	2	2019
Annual SW Release: Annual SW Release 2020	2	2020	2	2020
Annual SW Release: Annual SW Release 2021	2	2021	2	2021
Annual SW Release: Annual SW Release 2022	2	2022	2	2022
Annual SW Release: Annual SW Release 2023	2	2023	2	2023
Annual SW Release: Annual SW Release 2024	2	2024	2	2024
Test and Validation, All Sites: Test and Validation 1, All Sites 2018	1	2018	4	2024
Mid Year Release: Mid Year Release 2018	4	2018	4	2018
Mid Year Release: Mid Year Release 2019	4	2019	4	2019
Mid Year Release: Mid Year Release 2020	4	2020	4	2020
Mid Year Release: Mid Year Release 2021	4	2021	4	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Mid Year Release: Mid Year Release 2022	4	2022	4	2022
Mid Year Release: Mid Year Release 2023	4	2023	4	2023
Mid Year Release: Mid Year Release 2024	4	2024	4	2024
Full Operating Capability (FOC) Combined: Full Operating Capability (FOC)/Full Development (FD)	2	2019	2	2019
Deployable Virtual Training Environment (DVTE)				
Software Development - Contract Award: Software Development - Contract Award 2018	3	2018	3	2018
Software Development - Contract Award: Software Development - Contract Award 2019	3	2019	3	2019
Software Development - Contract Award: Software Development - Contract Award 2020	3	2020	3	2020
Software Development - Contract Award: Software Development - Contract Award 2021	2	2021	2	2021
Software Development - Contract Award: Software Development - Contract Award 2022	2	2022	2	2022
Software Development - Contract Award: Software Development - Contract Award 2023	2	2023	2	2023
Software Development - Contract Award: Software Development - Contract Award 2024	2	2024	2	2024
Software Development Version Release - VBS: Software Development Version Release - VBS (2018)	4	2018	4	2018
Software Development Version Release - VBS: Software Development Version Release - VBS (2019)	4	2019	4	2019
Software Development Version Release - VBS: Software Development Version Release - VBS (2020)	4	2020	4	2020
Software Development Version Release - VBS: Software Development Version Release - VBS (2021)	4	2021	4	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Software Development Version Release - VBS: Software Development Version Release - VBS (2022)	4	2022	4	2022
Software Development Version Release - VBS: Software Development Version Release - VBS (2023)	4	2023	4	2023
Software Development Version Release - VBS: Software Development Version Release - VBS (2024)	4	2024	4	2024
Marine Air/Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS)				
MTWS IPT/CCB: MTWS IPT/CCB 2018	3	2018	3	2018
MTWS IPT/CCB: MTWS IPT/CCB 2019	4	2019	4	2019
MTWS IPT/CCB: MTWS IPT/CCB 2020	3	2020	3	2020
MTWS IPT/CCB: MTWS IPT/CCB 2021	3	2021	3	2021
MTWS IPT/CCB: MTWS IPT/CCB 2022	3	2022	3	2022
MTWS IPT/CCB: MTWS IPT/CCB 2023	3	2023	3	2023
MTWS IPT/CCB: MTWS IPT/CCB 2024	3	2024	3	2024
Contract Award: Contract Award New Development	1	2018	1	2018
Contract Award: TO 7 Award	3	2018	3	2018
Contract Award: TO 8 Award	3	2018	3	2018
Contract Award: Contract Award Re-engineering	2	2019	2	2019
Contract Award: TO 1 Award	1	2019	1	2019
Contract Award: Contract Opt 1 Re-engineering	2	2020	2	2020
Contract Award: TO 2 Award	3	2020	3	2020
Contract Award: Contract Opt 2 Re-engineering	1	2021	1	2021
Contract Award: TO 3 Award	4	2021	4	2021
Contract Award: Contract Opt 3 Re-engineering	1	2022	1	2022
Contract Award: TO 4 Award	4	2022	4	2022
Contract Award: Contract Opt 4 Re-engineering	1	2023	1	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Contract Award: TO 5 Award	1	2023	1	2023
Contract Award: Contract Opt 5 Re-engineering	1	2024	1	2024
Contract Award: TO 6 Award	1	2024	1	2024
SW Release: SW Release 2018	1	2018	1	2018
Ranges and Training Area Management				
RISCon Development: RISCon SW Integration Testing 1st Qtr FY18	1	2018	1	2018
RISCon Development: RISCon SW Integration Testing 3rd Qtr FY18	3	2018	3	2018
RISCon Development: RISCon SW Integration Testing 1st Qtr FY19	1	2019	1	2019
RISCon Development: RISCon SW Integration Testing 3rd Qtr FY19	3	2019	3	2019
RISCon Development: RISCon SW Integration Testing 1st Qtr FY20	1	2020	1	2020
RISCon Development: RISCon SW Integration Testing 3rd Qtr FY20	3	2020	3	2020
RISCon Development: RISCon SW Integration Testing 1st Qtr FY21	1	2021	1	2021
RISCon Development: RISCon SW Integration Testing 3rd Qtr FY21	3	2021	3	2021
RISCon Development: RISCon SW Integration Testing 1st Qtr FY22	1	2022	1	2022
RISCon Development: RISCon SW Integration Testing 3rd Qtr FY22	3	2022	3	2022
RISCon Development: RISCon SW Integration Testing 1st Qtr FY23	1	2023	1	2023
RISCon Development: RISCon SW Integration Testing 3rd Qtr FY23	3	2023	3	2023
RISCon Development: RISCon SW Integration Testing 1st Qtr FY17	1	2024	1	2024
RISCon Development: RISCon SW Integration Testing 3rd Qtr FY17	3	2024	3	2024
Contract Award: Contract Award (2018)	1	2018	1	2018
Contract Award: Contract Award (2019)	4	2019	4	2019
Contract Award: Contract Award (2020)	1	2020	1	2020
Contract Award: Contract Award (2021)	1	2021	1	2021
Contract Award: Contract Award (2022)	1	2022	1	2022
Contract Award: Contract Award (2023)	1	2023	1	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Contract Award: Contract Award (2017)	2	2024	2	2024
Systems Integration: Systems Integration	1	2023	4	2023
Supporting Arms Virtual Trainer (SAVT)				
SW Development and Integration: FY18 Task Order Award	2	2019	2	2019
Immersive Training Range Support				
Virtual System Upgrade Deliverables: Virtual System Upgrade Deliverables	1	2018	1	2018
Consolidated Product Line Development Awards: Consolidated Product Line Development (2018)	1	2018	1	2018
Consolidated Product Line Development Awards: Consolidated Product Line Development (2019)	4	2019	4	2019
Consolidated Product Line Development Awards: Consolidated Product Line Development (2020)	1	2020	1	2020
Consolidated Product Line Development Awards: Consolidated Product Line Development (2021)	1	2021	1	2021
Consolidated Product Line Development Awards: Consolidated Product Line Development (2022)	1	2022	1	2022
Consolidated Product Line Development Awards: Consolidated Product Line Development (2023)	1	2023	1	2023
Consolidated Product Line Development Awards: Consolidated Product Line Development (2024)	1	2024	1	2024
Training Support				
LVC-TE AoA: LVC-TE AoA	1	2018	1	2019
Force on Force Training Systems (FoFTS)				
Contract Award: FY18 Award	1	2018	1	2018
Contract Award: FY19 Award	4	2019	4	2019
Contract Award: FY20 Award	1	2020	1	2020
Contract Award: FY21 Award	1	2021	1	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2315 / *Training Devices/Simulators*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Contract Award: FY22 Award	1	2022	1	2022
Contract Award: FY23 Award	1	2023	1	2023
Contract Award: I-TESS III Award	3	2019	3	2019
Integration Testing: Integration Testing 3rd Qtr FY18	3	2018	3	2018
Integration Testing: Integration Testing 1st Qtr FY19	1	2019	1	2019
Integration Testing: Integration Testing 3rd Qtr FY19	3	2019	3	2019
Integration Testing: Integration Testing 1st Qtr FY20	1	2020	1	2020
Integration Testing: Integration Testing 3rd Qtr FY20	3	2020	3	2020
Integration Testing: Integration Testing 1st Qtr FY21	1	2021	1	2021
Integration Testing: Integration Testing 3rd Qtr FY21	3	2021	3	2021
Integration Testing: Integration Testing 1st Qtr FY22	1	2022	1	2022
Integration Testing: Integration Testing 3rd Qtr FY22	3	2022	3	2022
Integration Testing: Integration Testing 1st Qtr FY23	1	2023	1	2023
Integration Testing: Integration Testing 3rd Qtr FY23	3	2023	3	2023
TACTICAL DECISI0N KITS (TDK)				
Intial Tasking: Intial Tasking	2	2018	2	2018
Contract Award, Tuva LLC, Herndon, VA: Contract Award, Tuva LLC, Herndon, VA	2	2018	2	2018
Authority to Operate (ATO) ends: Authority to Operate (ATO) ends	3	2019	3	2019
Training Simulation Support				
LVC-TE Integration (MTWS): LVC-TE Integration (MTWS)	3	2020	3	2020

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COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2503: *Initial Issue*	48.877	4.291	5.412	5.498	-	5.498	5.756	5.845	5.938	6.055	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Load Bearing and Pack Systems now includes the Waterproof bag efforts previously included under Individual Warfighting Equipment.

A. Mission Description and Budget Item Justification

This funding provides research, development, test and evaluation on low cost items with an emphasis on Non-Developmental Items/Commercial-Off-the-Shelf (NDI/ COTS) available items. Much of the RDT&E is conducted in coordination/concert with other services and joint organizations, and in consideration of RDT&E efforts being pursued by the other Services. Items approved for procurement will transition into Operation and Maintenance Marine Corps accounts for Infantry Combat Equipment, Family of Shelters, and Combat Field Feeding Systems; Family of Field Medical Equipment. Beginning in FY19 for the Family of Field Medical Equipment, items approved for procurement will also transition to the Procurement, Marine Corps account. The benefits will be reduced logistics, less weight, improved combat effectiveness, better echelon I and II care for Marines, improved individual and unit protection, expeditionary feeding platforms, tactical mobility, calibration and maintenance, etc. The employment of state of the art equipment will ensure Marines are equipped and supported with the best items that technology can offer.

The Infantry Combat Equipment portfolio of capabilities encompasses Marine Corps Uniforms, Cold Weather and Mountaineering, Load Bearing and Pack Systems, and Individual Warfighting Equipment research, development and testing of enhancements, upgrades and modifications to legacy systems and new developments. Funding for this capability area leverages other Services' and governmental partners' efforts to maximize returns on investment and promote coordination and cooperation for same or similar requirements and capabilities. The objective is to equip individual Marines with uniforms and combat equipment to maximize effectiveness in every environment across the full range of military operations.

The Family of Field Medical Equipment (FFME) focus is to provide state of the art medical equipment and emerging medical technology that will improve the clinical outcomes for casualties. The focus is also to replace obsolete items with those that fulfill the requirements and needs while increasing performance characteristics in the areas of energy efficiency, durability, reliability, weight, size and survivability in austere environments of a variety of climes.

The Family of Shelters and Shelters Equipment (FSSE) and The Family of Combat Field Feeding Systems (CFFS) portfolio focus is to provide high-quality and scalable expeditionary capabilities to the warfighter. The Family of Shelters provides the material solutions required to protect the Operating Forces from observation, adverse climatic environments, and combat hazards. The Family of Combat Field Feeding provides food preparation and service equipment to sustain Marines on-the-move and in a static position. The objective is to maximize fuel efficiency, reduce size and weight, and improve transportability.

The Calibration and Maintenance Program (CAMP) provides a calibration and maintenance capability supporting the calibrated tools and test equipment used by over 40,000 Marine maintainers and technicians. Calibration of tools as simple as torque wrenches to as complex as satellite test equipment is required to ensure their safe

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operation. This funding will be used to develop new test procedures as well as test new calibration equipment used to support weapon systems being deployed by Marine Corps forces.

Family of Expeditionary Water Systems (FEWS) is a family of systems line that contains water bath, shower, and laundry systems and well as water purification, storage, distribution, hygiene and test systems. This capability is necessary to provide safe and potable water to Marines in expeditionary environments. The family contains individual Table of Allowance Material Control Numbers which supports MAGTF operations by providing all aspects of land-based water support to include analysis, purification, reuse, storage, transfer and dispensing.

Family of Expeditionary Fuel Systems (FEFS) is a family of systems line that contains highly versatile fuel systems designed to receive, test, store, transfer and dispense fuel in support of Marine Air Ground Tactical Force (MAGTF) operations. The family contains individual Table of Allowance Material Control Numbers which supports MAGTF operations by providing all aspects of land-based fuel support to include analysis, receipt, storage, transfer and dispensing including all the components required to configure those systems.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Marine Corps Uniforms (MCU)	0.567	0.964	0.885	0.000	0.885
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue research, development, testing and evaluation (RDT&E) to increase effectiveness of Flame Resistant properties in existing uniforms. Efforts include RDT&E on lower cost, more durable, and comfortable Flame Resistant utility uniforms to increase protection of individual Marines in training and in combat. Testing will require larger scale lab and field testing. - Continue testing and evaluation of emerging Marine Corps Uniform Board (MCUB) and Commandant of the Marine Corps (CMC) uniform initiatives (tropical uniforms and boots). - Continue research and development of tropical uniforms, including footwear, and develop affordable alternatives. Testing will require larger scale lab and field testing. - Continue clothing and fabric improvement efforts leveraging advanced technologies in uniform durability, design, and footwear development. - Continue research, development and testing to enhance appearance and service life of Seabag issue, which consists of initial basic training clothing, footwear, and associated individual uniform items. - Continue research and development of enhanced camouflage protection in the shortwave infrared (SWIR) and thermal signature spectrum. Materials, both flame resistant and non-flame resistant, were produced and analyzed.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue testing to impart flame resistant properties to non-flame resistant uniform (MCCUU) by adding chemistry in the manufacturing process. ***FY 2020 Base Plans:*** - Continue research, development, testing and evaluation (RDT&E) to increase effectiveness of Flame Resistant properties in existing uniforms. Efforts include RDT&E on lower cost, more durable, and comfortable Flame Resistant utility uniforms to increase protection of individual Marines in training and in combat. Testing will require larger scale lab and field testing. - Continue research and development for lighter uniforms, including footwear, and develop affordable alternatives. Testing will require larger scale lab and field testing. - Continue clothing and fabric improvement efforts leveraging advanced technologies in uniform durability, design, and footwear development. - Continue to support Marine clothing efforts, to include field and dress uniforms and certification of their associated accoutrements which includes badges, ribbons and devices. - Continue research, development and testing to enhance appearance and service life of Seabag issue items, which consists of initial basic training clothing, footwear, and associated individual uniform items. - Continue research and development of enhanced camouflage protection and mitigation of signature in the shortwave infrared (SWIR) and thermal spectrum. Produce and analyze flame resistant and non-flame resistant materials with enhanced signature mitigation. - Continue testing to impart flame resistant properties to non-flame resistant uniform (MCCUU) by adding chemistry in the manufacturing process. ***FY 2020 OCO Plans:*** - N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $.079M from 2019 to 2020 is in line with requirements and resource realignment of all commodity areas within the budget.					
Title: Cold Weather and Mountaineering (CWM)	1.711	1.575	1.492	0.000	1.492
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to conduct research and development of industry technology to further enhance existing equipment effectiveness while lightening the load of the individual Marine.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue to conduct market research for the Cold Weather clothing items to identify product improvements for the Cold Weather Facemask, Cold Weather Balaclava, and the Single Suspender Solution based upon existing requirements and to procure necessary test articles to support a Limited User Evaluation during FY20. - Continue validation of ski systems and all components to include boots and clothing in order to procure an effective military ski system to full AAO. - Continue the comparative analysis of sister services clothing items to minimize sustainment cost. - Continue modernization of existing suite of equipment to incorporate technology advances which will drive the development of the Marine Assault Climbers Kit (MACK). - Continue Marine Corps Cold Weather Infantry Kit (MCCWIK) evaluation to assess change proposals. - Continue evaluation of Extreme Cold Weather boots and Intense Cold Weather boot. - Continue on improvements to existing combat utility uniform and boots to include mitigation of shortwave infrared (SWIR) and thermal signatures, while increasing the Flame Resistance (FR) properties of combat uniforms. - Continue developing material solutions for service uniforms, combat utility uniforms, tropical weather clothing, boots, and equipment. - Conduct Field User Evaluation (FUE) on Military Ski System (MSS).					
FY 2020 Base Plans: - Continue to conduct research and development of industry technology to further enhance existing equipment effectiveness while lightening the load of the individual Marine. - Continue to conduct research for the Cold Weather clothing items to identify product improvements for the Cold Weather Facemask, Cold Weather Balaclava, headwear, and the Single Suspender Solution based upon existing requirements and to procure necessary test articles to support a Limited User Evaluation during FY20. - Continue validation of ski systems and all components to include boots and clothing in order to procure an effective military ski system to full AAO. - Continue the comparative analysis of sister services clothing items to minimize sustainment cost. - Continue modernization of existing suite of equipment to incorporate technology advances which will drive the development of the Marine Assault Climbers Kit (MACK). - Continue Marine Corps Cold Weather Infantry Kit (MCCWIK) evaluation to assess change proposals. - Continue evaluation of Extreme Cold Weather boots and Intense Cold Weather boot. - Continue on improvements to existing materials to include mitigation of shortwave infrared (SWIR) and thermal signatures, while increasing the Flame Resistance (FR) properties of cold weather and combat uniforms.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue developing material solutions for service uniforms, combat utility uniforms, cold weather clothing, boots, and equipment. ***FY 2020 OCO Plans:*** - N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease $.083M between PB19 and PB20 is in line with requirements and resource realignment of all commodity areas within the budget.					
Title: Load Bearing and Pack Systems (LBPS)	0.298	0.298	0.357	0.000	0.357
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to explore potential avenues for product improvements and upgrades for LBPS by leveraging technological advancements of industry; lighten load and increase mobility of effectiveness. Primary focus will be to finalize Pack Adjustment Modification design, develop improved magazine pouches, and develop Scalable Load Carrier. - Continue evaluations on loadbearing equipment such as prototype versions of magazine pouches and Scalable Load Carrier to implement product improvements to USMC LBPS systems. ***FY 2020 Base Plans:*** - Continue to explore potential avenues for product improvements and upgrades for LBPS by leveraging technological advancements of industry; lighten load and increase mobility of effectiveness. Primary focus will be to update rifleman and grenadier set pouches. - Continue evaluations on loadbearing equipment such as Marine Corps pouch sets to implement product improvements to USMC LBPS systems. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $.059M from 2019 to 2020 funds the development, testing, and evaluation of replacement pouches to support changes to weapon systems, magazines, and ammunition.					
Title: Individual Warfighting Equipment (IWE)	0.186	0.112	0.134	0.000	0.134
Articles:	-	-	-	-	-

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: - Continue cataloging for future sustainment of Mechanical Breachers Kit (MBK) through Defense Logistics Agency (DLA). - Continue modernization of existing projects by leveraging the technological advances of industry. ***FY 2020 Base Plans:*** - Continue cataloging for future sustainment of Mechanical Breachers Kit (MBK) through Defense Logistics Agency (DLA). - Continue modernization of existing projects, including knee & elbow pads, by leveraging the technological advances of industry. ***FY 2020 OCO Plans:*** - N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $.022M from 2019 to 2010 due to minor modification to high demand low intensity SL3 items.					
Title: *Family of Field Medical Equipment (FFME)	0.900	1.001	1.028	0.000	1.028
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to test COTS/NDI medical equipment items for the En Route Care System (ERCS), Forward Resuscitative Surgery System (FRSS) and Shock Trauma Platoon (STP) to determine future viability in an operational environment, such as improved oxygen generation efforts, and field sterilization. - Continue testing of medical equipment items to evaluate their energy efficiency, functionality and ability to improve the quality of healthcare provided to the warfighter and reduce the logistics footprint of USMC medical equipment, such as improved blood product storage and refrigeration. - Continue testing and product development for possible application technology for insertion. - Continue collaborative testing with Army for patient movement research. - Continue collaborative testing efforts with Army for Traumatic Brain Injury (TBI) non-invasive diagnosis and treatment to determine viability in a operational environment in support of reduction of TBI effects. ***FY 2020 Base Plans:*** - Continue to test COTS/NDI medical equipment items for the ERCS, FRSS and STP to determine future viability in an operational environment.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue testing of medical equipment items to evaluate their energy efficiency, functionality and ability to improve the quality of healthcare provided to the warfighter and reduce the logistics footprint of USMC medical equipment. - Continue testing and product development for possible application technology for insertion, such as portable patient life support systems to be employed for forward resuscitative care and casualty evacuation, consolidating currently independent equipment sets. - Continue collaborative testing efforts with Army for TBI non-invasive diagnosis and treatment to determine viability in a operational environment in support of reduction of TBI effects. - Complete collaborative testing with Army for patient movement research. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in funding of $0.027M from FY19 to FY20 aligns with the COTS/NDI medical equipment test and evaluation plans for AMAL insertion.					
Title: *Family of Shelters and Shelter Equipment (FSSE) ***Articles:***	0.384 -	0.185 -	0.192 -	0.000 -	0.192 -
FY 2019 Plans: - Continue development and evaluation of energy efficient Engineering Change Proposals (ECPs) such as alternative construction materials and processes for FSSE. ***FY 2020 Base Plans:*** - Continue development and evaluation of energy efficient ECPs such as alternative production techniques and designs for FSSE. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** -PB19 to PB20 decrease ($177K FY19) reflects early completion of SSH effort. Funding realigned to Combat Field Feeding Systems (CFFS) to support Feeding-On-The-Move effort. -FY19 to FY20 increase $7K aligns with cost of executing ECPs.					
Title: *Family of Combat Field Feeding (CFFS)	0.245	0.227	0.060	0.000	0.060

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue evaluation testing of technological improvements for use in CFFS that will reduce the overall logistics burden such as alternative appliances and components. - Complete testing for Phase II SBIR Prototype for Alternate Energy Sources for Heating Rations. - Initiate and complete testing of Feeding-On-The-Move on multiple vehicle and trailer configurations. ***FY 2020 Base Plans:*** - Continue testing of technological improvements for use in CFFS that will reduce the overall logistics burden such as alternative field sanitation solutions and adaptation of commercial food service components. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** - PB19 to PB20 increase $177K in FY19 reflects funding realigned from Family of Shelters and Shelter Equipment (FSSE) to CFFs in support of Feeding-On-The-Move effort. - FY19 to FY20 decrease ($167K) aligns with the FY19 completion of the Feeding-On-The-Move testing on multiple vehicle and trailer configurations.					
Title: Calibration and Maintenance Program (CAMP)	0.000	0.250	0.250	0.000	0.250
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiate exploration of emerging technologies to enhance technical capabilities of individual calibration equipment used within expeditionary calibration facilities by deployed Marine Corps units. New calibration equipment is required to replace obsolete items. ***FY 2020 Base Plans:*** - Continue exploration of emerging technologies to enhance technical capabilities of individual calibration equipment used within expeditionary calibration facilities by deployed Marine Corps units. New calibration equipment is required to replace obsolete items. ***FY 2020 OCO Plans:*** N/A					
Title: Family of Expeditionary Water Systems (FEWS)	0.000	0.400	0.700	0.000	0.700

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: -Initiate market research for Grey Water Recycling research to support improvements to the Combat Batch Laundry (CBL) and Shower systems. ***FY 2020 Base Plans:*** -Continue market research for Grey Water Recycling research to support improvements to various Expeditionary Water Systems to include Combat Batch Laundry (CBL) and Shower systems. -Initiate market research, Squad Water Purification System and Reverse Osmosis element upgrades (Legacy POR upgrades). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in FY 2020 supports market research, testing and refinement of shower system upgrades to the legacy program of record.					
Title: Family of Expeditionary Fuel Systems (FEFS)	0.000	0.400	0.400	0.000	0.400
Articles:	-	-	-	-	-
FY 2019 Plans: -Initiate market research of fuel systems utilized by a MAGTF during operations to right size fuel systems for proper distribution, storage and test capabilities. ***FY 2020 Base Plans:*** -Continue market research of fuel systems utilized by a MAGTF during operations to right size fuel systems for proper distribution, storage and test capabilities. ***FY 2020 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	4.291	5.412	5.498	0.000	5.498

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/6522: *Family of FIeld Medical Equipment*	0.000	33.513	2.898	-	2.898	4.190	10.162	5.118	5.220	Continuing	Continuing
• PMC/4181: *Calibration & Maintenance Program (CAMP).*	0.576	11.916	11.817	-	11.817	2.829	2.931	0.144	0.147	Continuing	Continuing
• PMC/6670: *Family of Expeditionary Water Systems (FEWS)*	2.211	4.263	5.079	-	5.079	5.193	3.507	3.566	3.636	Continuing	Continuing
• PMC/6277: *Family of Expeditionary Fuel Systems (FEFS)*	1.788	0.054	0.052	-	0.052	0.051	0.051	0.050	0.051	Continuing	Continuing

Remarks

D. Acquisition Strategy

Cold Weather and Mountaineering, Load Bearing and Pack Systems, Individual Warfighting Equipment, Marine Corps Uniforms: Items utilize various acquisition strategies. These programs leverage heavily on current developments and technology in commercial industry. As a result, the government's R&D phase is relatively short. Contracting is performed by either Marine Corps Systems Command Contracting Directorate, the Naval Research Laboratory or the U.S. Army Natick Soldier Research, Development and Engineering Center via Indefinite Delivery/Indefinite Quantity (ID/IQ) contracts. ID/IQ contracts are used to decrease the government risk, allow maximum contract flexibility and capitalize on the savings realized by utilizing Economic Order (EO) Quantities.

Family of Shelters: The Shelter acquisition strategy is to modify NDI to further meet the requirements of the Marine Corps, to support development of multi-service items through inter-service agreements and to adopt COTS items.

Family of Field Medical Equipment: These programs leverage heavily on current development and technology in the commercial medical industry. The field medical acquisition strategy is to modify NDI and adopt COTS items. Due to the nature of medical device development and the USMC reliance on commercial RDT&E practices, it is frequently difficult to accurately predict successful transition due in part to strict Food and Drug Administration oversight and approval processes.

Combat Field Feeding Systems: This program utilized various acquisition strategies and leverages heavily on current developments and technology in commercial industry and other Service field feeding systems. As a result, the government's RDTE phase is relatively short. Contracting is performed by either Marine Corps Systems Command Contracting Directorate or the U.S. Army Natick Soldier Research, Development and Engineering Center (DoD Executive Agent for Field Feeding) via ID/IQ contracts. ID/IQ contracts are used to decrease the government risk, allow maximum contract flexibility and capitalize on the savings realized by utilizing EO Quantities.

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Calibration and Maintenance Program (CAMP): The CAMP acquisition strategy is to evaluate NDI items and ask industry for enhancements and modifications to meet technical and expeditionary requirements. This will be in concert with Navy's calibration RDT&E efforts.

Family of Expeditionary Water Systems (FEWS): Research and development supports market research and water studies to ensure systems support current and future CONOPS and USMC O-Plans at the enterprise level. Current thrust areas are Grey Water Recycling and small unit water purification as well as upgrading/replacing legacy systems.

Family of Expeditionary Fuel Systems (FEFS): Research and development supports fuel system modularity, test kits, improved collapsible fabric tanks, and ship-to beachhead and beachhead to inland fuel distribution as well as upgrading/replacing legacy systems.

E. Performance Metrics

N/A

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Calibration and Maintenance Program	WR	NSWC : Corona, CA	0.000	0.000		0.250	Nov 2018	0.250	Jan 2020	-		0.250	Continuing	Continuing	Continuing
Family of Field Medical	C/FFP	MCSC : Quantico, VA	0.000	0.199	Mar 2018	0.686	Feb 2019	0.000		-		0.000	0.000	0.885	-
Cold Weather & Mountaineering	MIPR	USA NSRDEC : Natick, MA	0.299	0.949	Apr 2018	0.814	Feb 2019	0.737	Feb 2020	-		0.737	Continuing	Continuing	Continuing
Family of Shelters and Shelter Equipment	MIPR	USA NSRDEC : Natick, MA	1.084	0.180	Nov 2017	0.000		0.177	Feb 2020	-		0.177	0.000	1.441	-
Load Bearing and Pack Systems	MIPR	AFRL : Wright Patterson AFB	0.635	0.298	Feb 2018	0.298	Feb 2019	0.357	Feb 2020	-		0.357	Continuing	Continuing	Continuing
Family of Field Medical	MIPR	Natick : Natick, MA	1.232	0.136	Nov 2017	0.000		0.000		-		0.000	0.000	1.368	-
Individual Warfighting Equipment	MIPR	USA NSRDEC : Natick, MA	0.570	0.187	May 2018	0.112	Feb 2019	0.134	Feb 2020	-		0.134	Continuing	Continuing	Continuing
Marine Corps Uniforms	MIPR	USA NSRDEC : Natick, MA	5.631	0.354	Jan 2018	0.482	Feb 2019	0.443	Dec 2019	-		0.443	Continuing	Continuing	Continuing
Prior Year Cumulative Funding	Various	Various : Various	21.760	0.000		0.000		0.000		-		0.000	0.000	21.760	-
		Subtotal	31.211	2.303		2.642		2.098		-		2.098	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Cumulative Funding	Various	Various : Various	1.096	0.000		0.000		0.000		-		0.000	0.000	1.096	-
		Subtotal	1.096	0.000		0.000		0.000		-		0.000	0.000	1.096	N/A

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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Marine Corps Uniform	MIPR	NCTRF : Natick, MA	0.290	0.118	Jan 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Family of Field Medical	MIPR	U.S. Army Aeromedical Research Lab : Ft. Rucker, AL	0.000	0.101	Jul 2018	0.120	Feb 2019	0.220	Mar 2020	-		0.220	0.000	0.441	-
Family of Field Medical	MIPR	NSWC : Crane, ID	0.000	0.115	May 2018	0.000		0.115	Apr 2020	-		0.115	0.000	0.230	-
Family of Shelters & Shelter Equipment	MIPR	NSWC : Crane, ID	0.000	0.093	May 2018	0.000		0.000		-		0.000	0.000	0.093	-
Family of Shelters and Shelter Equipment	MIPR	Naval Surface AWarfare Center : Crane, ID	0.000	0.111	Dec 2017	0.000		0.000		-		0.000	0.000	0.111	-
Family of Field Medical	MIPR	Naval Surface Warfare Center : CRANE	0.000	0.000	Aug 2018	0.120	Dec 2018	0.000		-		0.000	0.000	0.120	-
Family of Field Medical	C/FFP	MCSC : Qauntico, VA	0.000	0.000		0.000		0.434	Nov 2019	-		0.434	0.000	0.434	-
Family of Expeditionary Water Systems	MIPR	NAVFAC : Port Hueneme, CA	0.000	0.000		0.400	Mar 2019	0.400	Mar 2020	-		0.400	0.000	0.800	-
Family of Combat Field Feeding	MIPR	USA NSRDEC : Natick, MA	0.734	0.073	Oct 2017	0.100	Jan 2019	0.060	Jan 2020	-		0.060	Continuing	Continuing	Continuing
Family of Expeditionary Water Systems	MIPR	ATC : Aberdeen Proving Grd, MD	0.000	0.000		0.000		0.300	Mar 2020	-		0.300	0.000	0.300	-
Family of Expeditionary Fuel Systems	MIPR	ARL : Aberdeen Proving Grd, MD	0.000	0.000		0.400	Mar 2019	0.400	Mar 2020	-		0.400	0.000	0.800	-
Family of Combat Field Feeding	MIPR	ATC : Aberdeen, MD	0.000	0.172	Nov 2017	0.127	Jan 2019	0.000		-		0.000	0.000	0.299	-
Marine Corps Uniforms	MIPR	USA NSRDEC : Natick, MA	0.767	0.094	Jan 2018	0.482	Feb 2019	0.442	Jan 2020	-		0.442	Continuing	Continuing	Continuing
Family of Field Medical	MIPR	USAARL : Ft. Rucker, AL	1.508	0.000		0.000		0.220	Jan 2020	-		0.220	Continuing	Continuing	Continuing
Family of Shelters & Shelter Equipment	MIPR	USA NSRDEC : Natick, MA	0.627	0.000		0.171	Jan 2019	0.000		-		0.000	0.000	0.798	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2503 / *Initial Issue*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Cold Weather and Mountaineering	MIPR	USA NSRDEC : Natick, MA	1.997	0.762	Dec 2017	0.761	Feb 2019	0.755	Mar 2020	-		0.755	Continuing	Continuing	Continuing
Family of Field Medical	MIPR	NSWC : Dahlgren, VA	10.286	0.309	Aug 2018	0.000		0.000		-		0.000	0.000	10.595	-
		Subtotal	16.209	1.948		2.681		3.346		-		3.346	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Cumulative Funding	Various	Various : Various	0.361	0.000		0.000		0.000		-		0.000	0.000	0.361	-
Family of Field Medical	Various	MARCORSYSCOM : Quantico, VA	0.000	0.040	Aug 2018	0.035	Aug 2019	0.000		-		0.000	0.000	0.075	-
Family of Shelters and Shelter Equipment	Various	MCSC : Quantico, VA	0.000	0.000		0.014	Oct 2018	0.015	Oct 2019	-		0.015	0.000	0.029	-
Family of Field Medical	Various	MCSC : Quantico, VA	0.000	0.000		0.040	Oct 2018	0.039	Oct 2019	-		0.039	0.000	0.079	-
		Subtotal	0.361	0.040		0.089		0.054		-		0.054	0.000	0.544	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	48.877	4.291		5.412		5.498		-		5.498	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2503 / *Initial Issue*

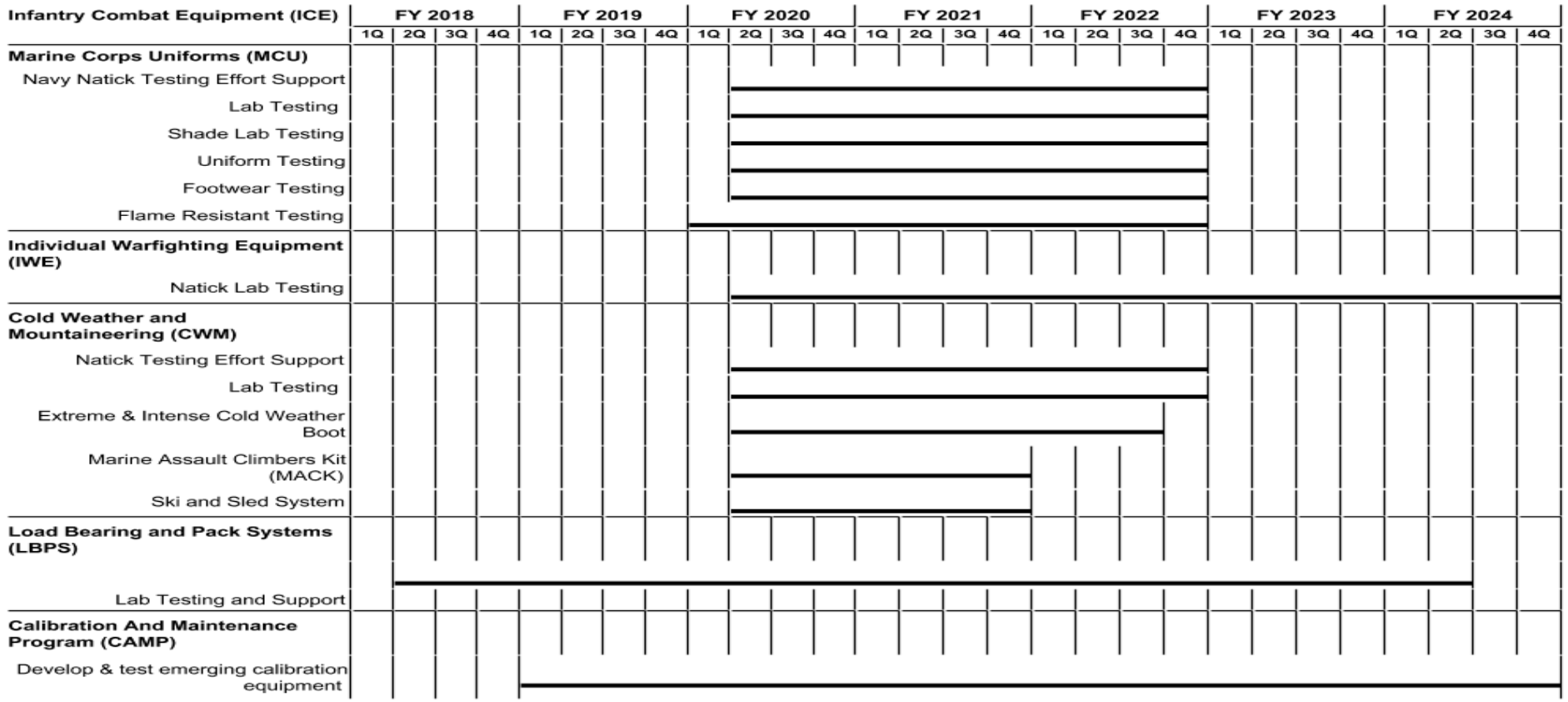

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2503 / *Initial Issue*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Infantry Combat Equipment (ICE)				
Marine Corps Uniforms (MCU): Navy Natick Testing Effort Support:	2	2020	4	2022
Marine Corps Uniforms (MCU): Lab Testing:	2	2020	4	2022
Marine Corps Uniforms (MCU): Shade Lab Testing:	2	2020	4	2022
Marine Corps Uniforms (MCU): Uniform Testing:	2	2020	4	2022
Marine Corps Uniforms (MCU): Footwear Testing:	2	2020	4	2022
Marine Corps Uniforms (MCU): Flame Resistant Testing:	1	2020	4	2022
Individual Warfighting Equipment (IWE): Natick Lab Testing:	2	2020	4	2024
Cold Weather and Mountaineering (CWM): Natick Testing Effort Support:	2	2020	4	2022
Cold Weather and Mountaineering (CWM): Lab Testing:	2	2020	4	2022
Cold Weather and Mountaineering (CWM): Extreme & Intense Cold Weather Boot:	2	2020	3	2022
Cold Weather and Mountaineering (CWM): Marine Assault Climbers Kit (MACK):	2	2020	4	2021
Cold Weather and Mountaineering (CWM): Ski and Sled System:	2	2020	4	2021
Load Bearing and Pack Systems (LBPS): Load Bearing and Pack Systems (LBPS)	2	2018	2	2024
Calibration And Maintenance Program (CAMP)				
Develop & test emerging calibration equipment:	1	2019	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2513 / *Body Armor*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2513: *Body Armor*	51.076	4.205	4.970	4.771	-	4.771	4.696	4.793	4.833	4.930	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Ballistic Protection Systems (BPS) provides the most technologically advanced protection at the lightest weight available in the world today. It provides the critical ballistic protective systems that save lives, reduce the severity of combat injuries, and increase combat effectiveness by keeping more Marines in the fight. Major BPS programs include: Plate Carrier Generation III (PC Gen III); Enhanced Small Arms Protective Inserts (ESAPI); Enhanced Combat Helmet (ECH); Improved Ballistic Eyewear (IBE); and Hearing Enhancement. The major focus areas of all BPS programs are adapting ballistic protective systems to the constantly changing threat environment and leveraging emerging technologies to lighten the load and increase the mobility of each Marine.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Ballistic Protection Systems	4.205	4.970	4.771	0.000	4.771
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue research with industry partners towards understanding and developing the future technology associated with next generation PPE (i.e. helmets, body armor, eyewear, and hearing protection). - Continue to research active and passive hearing protection products that provide a sense of presence and protection against transient impact noise and blocks and/or reflects harmful blast shock wave in the ear canal. - Continue testing for the next generation of eyewear, specifically the capability to protect against laser threats and to adjust rapidly in varying light conditions in order to gap the need for rapid situational awareness in different light environments. - Complete testing on the efficacy of plates as they age over time in order to obtain a clear understanding of the need to consistently sustain and maintain current plates, as well as, their future ballistic capability.					
FY 2020 Base Plans: - Continue research with industry partners towards understanding and developing the future technology associated with next generation PPE (i.e. helmets, body armor, eyewear, and hearing protection). - Continue to research active and passive hearing protection products that provide situational awareness and protection. - Continue testing for the next generation of eyewear, specifically the capability to protect against laser threats and to adjust rapidly in varying light conditions and provide laser protection.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2513 / *Body Armor*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue to develop solutions that provide improved fit, modularity, and integration of armor systems. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of .199M from FY2019 to FY2020 is due to the completion of the Plate Carrier Generation III First Article Test in FY2019.					
Accomplishments/Planned Programs Subtotals	4.205	4.970	4.771	0.000	4.771

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Marine Corps Ballistic Protection Systems (BPS) research, development, testing & evaluation activities include seeking new developments in ballistic technology that feature reductions in weight, improvements in ballistic performance, enhanced operational effectiveness through improved product designs and the application of new material technologies to reduce total ownership costs by improving the expected service life of fielded systems. In order to accomplish these goals, Program Manager-Infantry Combat Equipment uses a broad array of government and contractor performers to achieve the desired end state. This includes partnerships with government entities and research and development contracts and partnership intermediaries where applicable. The Marine Corps also leverages advancements in industry capabilities to rapidly field non-developmental and commercially available off the shelf armor solutions. Performance is confirmed by characterizing ballistic performance and data collected during user evaluations.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2513 / *Body Armor*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Ballistic Protection Systems	WR	NSWC : Dahlgren, VA	0.204	0.273	Nov 2017	0.145	Apr 2019	0.280	Nov 2019	-		0.280	0.000	0.902	-
Ballistic Protection Systems	MIPR	PM SPE Army : Ft Belvior	0.000	0.000		0.146	Feb 2019	0.000		-		0.000	0.000	0.146	-
Ballistic Protection Systems	MIPR	USA NSRDEC : Natick MA	9.477	0.000	Dec 2017	0.402	Dec 2018	0.500	Dec 2019	-		0.500	0.000	10.379	-
Ballistic Protection Systems	C/FFP	NRL : Washington DC	16.439	0.422	Mar 2018	0.522	Feb 2019	0.550	May 2020	-		0.550	0.000	17.933	-
Ballistic Protection Systems	MIPR	AFRL : Wright Parrerson, OH	4.559	0.968	Dec 2017	0.226	May 2019	0.200	May 2020	-		0.200	0.000	5.953	-
Ballistic Protection Systems	Various	MCSC : Various	2.244	0.316	Mar 2018	0.696	Dec 2018	0.418	Dec 2019	-		0.418	0.000	3.674	-
		Subtotal	32.923	1.979		2.137		1.948		-		1.948	0.000	38.987	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Ballistic Protection Systems	MIPR	NSRDEC : Natick, MA	0.351	0.520	Dec 2017	0.650	Dec 2018	0.650	Dec 2019	-		0.650	0.000	2.171	-
Ballistic Protection Systems	MIPR	MCSC : Quantico, VA	0.000	0.324	Aug 2018	0.319	Aug 2019	0.311	Aug 2020	-		0.311	0.000	0.954	-
Ballistic Protection Systems	MIPR	NCTRF: : Natick, MA	0.371	0.170	Feb 2018	0.270	Dec 2018	0.270	Dec 2019	-		0.270	0.000	1.081	-
Cumulative Funding Total	Various	CECOM : MITRE SUPPORT	0.054	0.000		0.000		0.000		-		0.000	0.000	0.054	-
		Subtotal	0.776	1.014		1.239		1.231		-		1.231	0.000	4.260	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2513 / *Body Armor*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Ballistic Protection Systems	MIPR	USA NSRDEC : Natick, MA	7.687	0.332	Apr 2018	0.100	Mar 2019	0.151	Mar 2020	-		0.151	0.000	8.270	-
Ballistic Protection Systems	MIPR	USA ATC : Aberdeen Prv Grnd, MD	1.298	0.327	May 2018	0.385	May 2019	0.350	May 2020	-		0.350	Continuing	Continuing	Continuing
Ballistic Protection Systems	WR	NRL : Washington, DC	3.415	0.000	Dec 2017	0.000	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing
Ballistic Protection Systems	MIPR	ARL : Various	0.488	0.230	Dec 2017	0.325	Jan 2019	0.321	Dec 2019	-		0.321	0.000	1.364	-
Ballistic Protection Systems	WR	NAVAL Health research Center : Arlington, VA	0.000	0.323	Dec 2017	0.000	Dec 2018	0.000		-		0.000	0.000	0.323	-
Ballistic Protection Systems	WR	NSWC : Indian Head, MD	0.188	0.000		0.000		0.000		-		0.000	0.000	0.188	-
Ballistic Protection Systems	MIPR	NAVSEA : Washington, DC	0.103	0.000		0.000		0.000		-		0.000	0.000	0.103	-
Ballistic Protection Systems	MIPR	DLA TLSP : Ft Belvior	0.000	0.000		0.199	Feb 2019	0.200	Feb 2020	-		0.200	0.000	0.399	-
Ballistic Protection Systems	MIPR	AFRL : Wright Patterson, OH	0.000	0.000		0.125	Dec 2018	0.120	Dec 2019	-		0.120	0.000	0.245	-
Ballistic Protection Systems	Various	MCSC : Quantico, VA	0.000	0.000	May 2018	0.460	Jun 2019	0.450	Mar 2020	-		0.450	0.000	0.910	-
Prior Year Cumulative Funding	Various	Various : Various	4.198	0.000		0.000		0.000		-		0.000	0.000	4.198	-
		Subtotal	17.377	1.212		1.594		1.592		-		1.592	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	51.076	4.205		4.970		4.771		-		4.771	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2513 / *Body Armor*

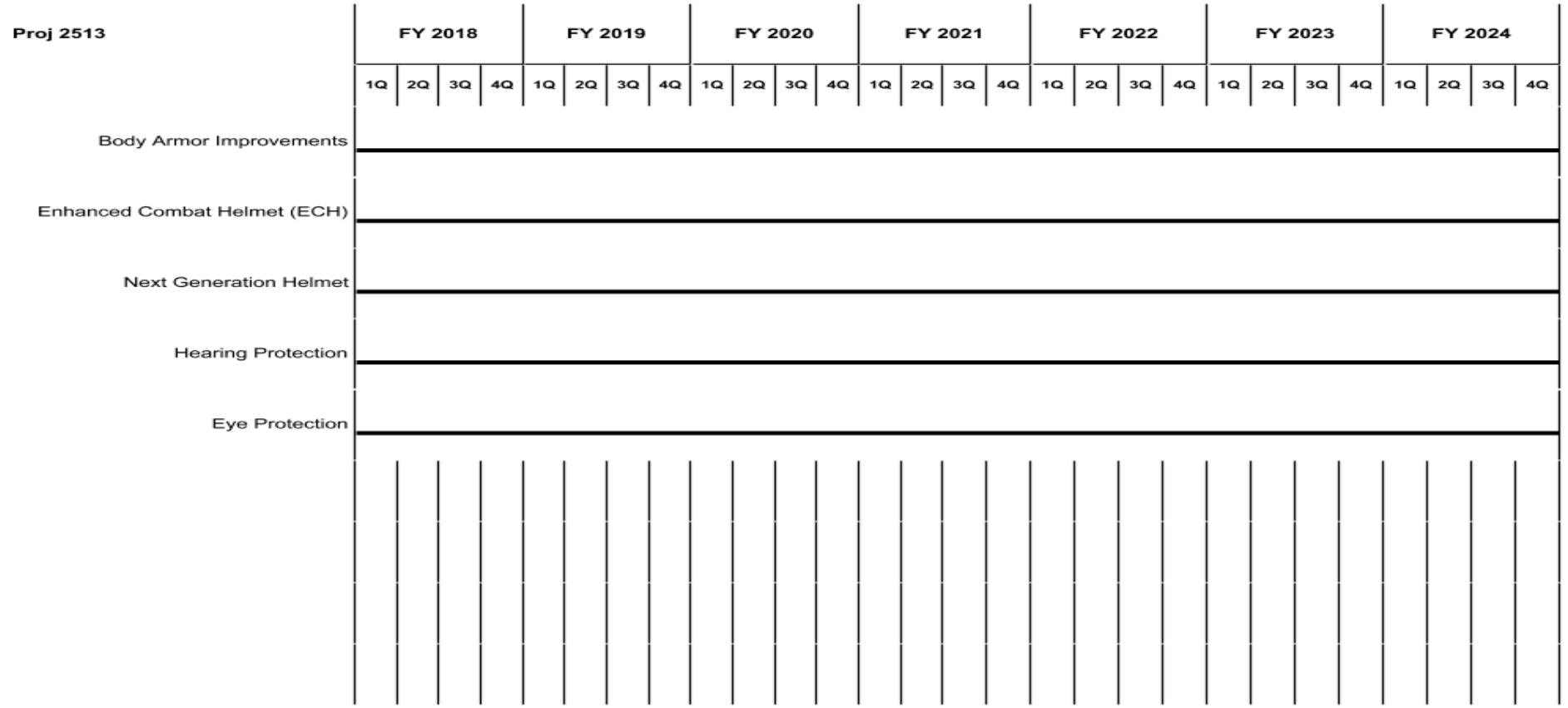

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2513 / *Body Armor*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2513				
Body Armor Improvements: Body Armor Improvements	1	2018	4	2024
Enhanced Combat Helmet (ECH): Enhanced Combat Helmet (ECH)	1	2018	4	2024
Next Generation Helmet: Next Generation Helmet	1	2018	4	2024
Hearing Protection: Hearing Protection	1	2018	4	2024
Eye Protection: Eye Protection	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2928 / *Exp Indirect Fire Gen Supt Wpn Sys*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2928: *Exp Indirect Fire Gen Supt Wpn Sys*	13.791	2.981	22.748	0.898	-	0.898	0.490	0.500	0.500	0.500	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

High Mobility Artillery Rocket Systems (HIMARS) which is a C-130 transportable, wheeled, indirect fire, rocket/missile system capable of firing all rockets and missiles Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM). The system includes one launcher, two Re-Supply Systems, and the MFOM. HIMARS provides the Marine Air-Ground Task Force (MAGTF)with 24 hour ground-based, responsive General Support/General Support Reinforcing (GS/GSR) indirect fires which accurately engage targets at long range (60+km), with high volumes of lethal fire under all weather conditions throughout all phases of combat operations ashore, to include irregular warfare and distributed operations. HIMARS is a significant improvement over previously fielded ground fire support systems. Expeditionary Indirect Fires provides the Ground Combat Element (GCE) needed to engage multiple threat systems. Development provides for the modernization and obsolescence mitigation of the HIMARS in order to provide improved operational capabilities

Funding for NMESIS effort moved from BA7 to BA4 in FY20-FY24 from 0206623M to 0603635M (Proj 7400) in support of:

The Navy/Marine Expeditionary Ship Interdiction System (NMESIS) is a major RDT&E effort to develop long term and short term solutions for an Anti-Ship Missile (ASM) capability in support of the Marine Corps Expeditionary Advanced Base Operations (EABO) and the National Defense Strategy approach to build a more lethal Joint Force. The NMESIS project will prototype a USMC system while leveraging other Service-developed missiles to provide a ground based anti-access/area denial, anti-ship capability. In addition, ASM capabilities will be further developed through advanced component improvements and launcher integration into a complex, prototype and unmanned ground vehicle system. Furthermore, the prototyping effort will include the development, design, build, and initial testing of a Remotely Operated Ground Unit Expeditionary (ROGUE) Fires vehicle. ROGUE-Fires is an unmanned ground vehicle based system on a Joint Light Tactical Vehicle (JLTV) chassis, capable of mounting a wide range of missile systems for dynamic force employment and supports the NDS objective to evolve innovative operational concepts. Overall, this effort provides strategic deterrence in the global operational environment through layered missile capability and dynamic force employment.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: HIMARS Expeditionary & Naval Integration Capabilities	2.981	22.748	0.898	0.000	0.898
Articles:	-	-	-	-	-
FY 2019 Plans: -Developed Re-supply System (RSS) radio/intercom replacement and integration -Provide engineering support for GMLRS Insensitive Munition (IM) rocket motor qualification and certifications					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2928 / *Exp Indirect Fire Gen Supt Wpn Sys*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Complete Re-supply System (RSS) radio/intercom replacement and integration. -Provide engineering and safety support for GMLRS Extended Range (ER) rocket motor qualification and certifications. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease from FY19 to FY20 is due to $21.85M being realigned from PE 0206623M/Project 2928 to PE 0603635M/Project 7400 in support of the Anti-Ship Missile (ASM) capability developmental and testing efforts.					
Accomplishments/Planned Programs Subtotals	2.981	22.748	0.898	0.000	0.898

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/BLI 221200: *High Mobility Artillery Rocket System (HIMARS)*	60.103	130.981	100.002	-	100.002	63.685	71.062	63.420	63.702	Continuing	Continuing

Remarks

D. Acquisition Strategy

RDT&E efforts for USMC HIMARS support Joint Force 2025 guidance, the National Defense Strategy (NDS) and the Maritime Operation Center (MOC) to employ HIMARS as a Sea Control capability from distributed locations to include naval platforms or surface connectors to support distributed maneuver. Support the continued development of long-range precision fire capabilities from austere and expeditionary bases and to improve the range and capacity to provide fires supporting multiple entry points from the sea. Development will consist of the design integration and support from a combination of Army/Navy labs and multiple DOD contractors.

E. Performance Metrics

Milestone Reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2928 / *Exp Indirect Fire Gen Supt Wpn Sys*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
HIMARS RSS intercom/ Radio Integration	WR	SPAWAR : Charleston, SC	0.000	0.000		0.000	Dec 2018	0.550	Dec 2019	-		0.550	0.000	0.550	-
NMESIS ASM OTA	C/BOA	MCSC : Quantico, VA	0.000	0.090	Sep 2018	0.000		0.000		-		0.000	0.000	0.090	-
HIMARS ASM Capabilities	Various	Various : Various	0.000	0.677	Jan 2018	19.295	Jan 2019	0.000		-		0.000	0.000	19.972	-
HIMARS expeditionary radio capabilities	MIPR	ARDEC: Redstone : Arsenal, AL	1.454	1.537	Jan 2018	0.000		0.000		-		0.000	0.000	2.991	-
HIMARS Comm Capabilities	Various	Various : Various	0.873	0.677	Jan 2018	0.000		0.000		-		0.000	0.000	1.550	-
HIMARS Safety Engineering Support	WR	NSWC : Indian Head, MD	0.000	0.000		0.000		0.098	Dec 2019	-		0.098	0.000	0.098	-
HIMARS Engineering Support	WR	NSWC : Dahlgren, VA	0.000	0.000		0.000		0.250	Dec 2019	-		0.250	0.000	0.250	-
		Subtotal	2.327	2.981		19.295		0.898		-		0.898	0.000	25.501	N/A

Remarks

Requirements for NMESIS (Long Range Precision Fires, Sea Control) is defined by the product development in support of Anti-Ship Missile (ASM) Capabilities and the unmanned Remotely Operated Ground Unit Expeditionary (ROGUE) Fires. NMESIS is a conjoined development and integration of both efforts.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
HIMARS anti-ship capabilities	Various	various : various	0.000	0.000		3.453	Nov 2018	0.000		-		0.000	0.000	3.453	-
Prior year cumulative funding	Various	various : various	5.820	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	5.820	0.000		3.453		0.000		-		0.000	Continuing	Continuing	N/A

Remarks

Requirements for NMESIS (Long Range Precision Fires, Sea Control) is defined by testing in support of Anti-Ship Missile (ASM) Capabilities and the unmanned Remotely Operated Ground Unit Expeditionary (ROGUE) Fires. NMESIS is the testing and integration of both efforts. FY19 will test the unmanned vehicle prototype and the ASM launcher onto the prototype.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 2928 / *Exp Indirect Fire Gen Supt Wpn Sys*	

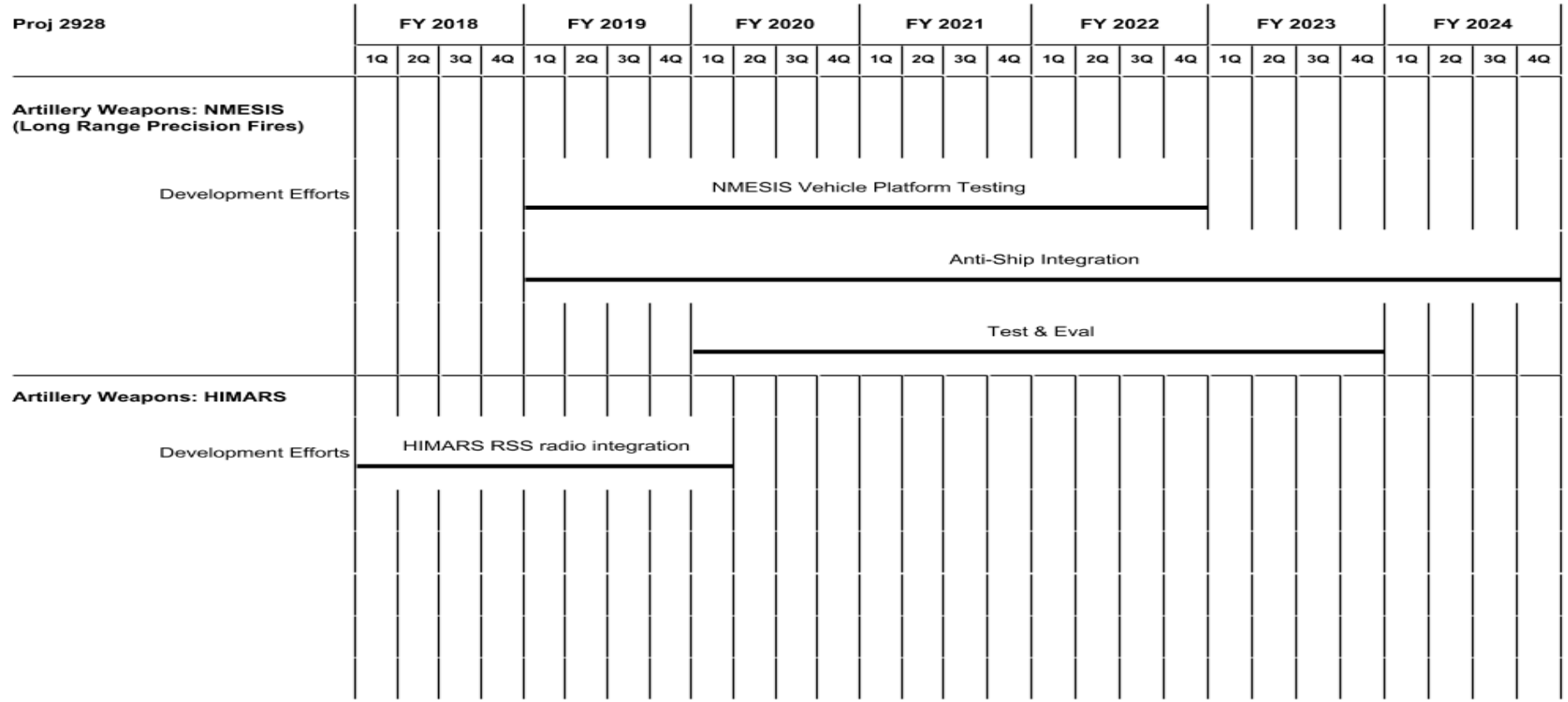
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior year cumulative funding	Various	Various : Various	5.644	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	5.644	0.000		0.000		0.000		-		0.000	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	13.791	2.981		22.748		0.898		-		0.898	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2928 / *Exp Indirect Fire Gen Supt Wpn Sys*



2020OSD - 0206623M - 2928

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 2928 / *Exp Indirect Fire Gen Supt Wpn Sys*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2928				
Artillery Weapons: NMESIS (Long Range Precision Fires): Development Efforts: NMESIS Vehicle Platform Testing	1	2019	4	2022
Artillery Weapons: NMESIS (Long Range Precision Fires): Development Efforts: Anti-Ship Integration	1	2019	4	2024
Artillery Weapons: NMESIS (Long Range Precision Fires): Development Efforts: Test & Eval	1	2020	4	2023
Artillery Weapons: HIMARS: Development Efforts: Communication Replacement and Integration	1	2018	1	2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3098: *Fire Support System*	149.717	5.559	5.999	7.773	-	7.773	6.856	3.100	3.183	3.246	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Fire Support System (FSS) provides the Marine Corps critical operational and logistics capabilities in artillery weapons, fire direction and targeting systems. This includes the following projects:

The Fire Support Mod Line (FSML) is a set of Marine Corps efforts to address critical operational and logistics deficiencies in existing, fielded fire support/weapons systems and equipment. FSML provides technical refresh and development of target acquisition, artillery survey, meteorological systems, weapon systems, and fire direction control. Funding is used to ensure Clinger Cohen Act (CCA) and Information Assurance (IA) requirements are met. Provides execution of product improvements/modifications, and upgrades to system hardware and software for the Marine Artillery Survey Set (MASS), Modeled Meteorological Information Manager (MMIM), Global Positioning System Survey (GPS-S) and the Improved Position Azimuth Determining System (IPADS), the Joint Terminal Attack Controller-Laser Target Designator (JTAC-LTD), and the Common Laser Range Finder (CLRF). Funding is also used for upgrades, engineering change proposals (ECPs), and modifications for guided munitions and fire control systems which fall within Fire Support Systems for the Marine Corps.

Family of Artillery Munitions (FAM) funding is used to develop and mature artillery munitions for the Marine Corps triad of fire and includes conducting safety and engineering analysis as well as ship compatibility studies.

The Common Laser Range Finder Integrated Capability (CLRF IC) is an association of targeting systems that provide handheld, lightweight, man portable devices supporting the employment of air and surface fires. They provide foot mobile users the ability to locate, identify, mark and designate targets in both day and night conditions for engagement by fire support and weapons platforms. CLRF IC systems support the collection and dissemination of targeting information to maneuver, fire support, and intelligence personnel via external digital devices such as the Advanced Field Artillery Tactical Data System (AFATDS) and the Target Handoff System (THS) using associated Combat Net Radios. The CLRF IC includes two major components; The CLRF IC Laser Range Finder(LRF) supports the requirement to locate and transmit targeting information while the Next Generation Hand Held Targeting System (NGHTS)combines the capabilities of the LRF with the ability to designate for specific requirements associated with laser guided munitions.

The Family of Internally Transportable Vehicles (FITV) are light weight and internally transportable in the V-22, CH-53D & CH53E tilt and rotary wing aircraft consisting of the Utility Task Vehicle (UTV), the future Ultra-Light Tactical Vehicle (ULTV), and the obsolete Internally Transportable Vehicle (ITV). The ITV included two vehicle platforms, the ITV Prime Mover (PM) and the ITV Light Strike Variant (LSV). The FITV provide deployed Marine Air-Ground Task Force (MAGTF) and Marine Expeditionary Unit (Special Operations Capable) (MEU (SOC)) with vehicles that are internally transportable in selected rotary and fixed wing aircraft. The FITV are expeditionary vehicles supporting over-the-horizon amphibious operations, irregular warfare and enhanced company operations. It is fielded to Infantry and Reconnaissance units. Speed, maneuverability, and the use of cover and concealment are the crew's primary means of survival. Efforts have begun to replace the current Family of Internally Transportable Vehicles. This initiative is called the Ultra-Light Tactical Vehicle (ULTV), which will replace the current Utility Task Vehicles

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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(UTV). The ULTV will be a government-off-the shelf (GOTS)/Commercial-Off-the-Shelf (COTS)/modified-off-the-shelf (MOTS) solution that will fulfill the FITV mission of an internally transportable vehicle noted above and is planned to have logistics, communications, and weapons mounted variants.

Conventional Ground Ammunition is a project that identifies and develops Insensitive Munitions (IM) Technologies to address IM shortfalls in new Marine Corps development or improvements to legacy Conventional Ground Ammunition to meet OSD mandated IM compliance requirements. These IM Technology investments directly support the development of the bi-annual Marine Corps Insensitive Munitions Strategic Plan (IMSP) to address the identified IM technology needs of the Marine Corps.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Fire Support Mods (FSM)	2.763	2.511	1.982	0.000	1.982
Articles:	-	-	-	-	-
Description: Funding is used for upgrades, engineering change proposals (ECP), and modifications to system hardware and software for the Marine Artillery Survey Set (MASS), Meteorological Information Manager (MMIM), Global Positioning System Survey (GPS-S), the Improved Position Azimuth Determining System (IPADS), and the Joint Terminal Attack Controller-Laser Target Designator (JTAC-LTD) as well as technical refresh for target acquisition, and artillery survey and meteorological systems. Funding is also used for upgrades, Engineering Change Proposals (ECPs) and modifications for guided munitions and fire control systems which falls within Fire Support Systems for the Marine Corps.					
FY 2019 Plans: - Continue development of GCFS replacement components for operational usage and obsolescence management. - Continue product improvements to increase performance capability of legacy targeting and other fire support systems. - Continue development of advanced components for the Improved Position Azimuth Determining System (IPADS) replacement system. - Complete Modeled Meteorological Manager (MMIM)communication testing with a Global Broadcast Service (GBS) Portal Receiver Suite (PRS).					
FY 2020 Base Plans: - Continue product improvements to increase performance capability of legacy targeting and other fire support systems. - Continue development of advanced components for the Improved Position Azimuth Determining System (IPADS) replacement system.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiate development of new software configuration changes for Modeled Meteorological Manager (MMIM) to inter-operate with global meteorological models. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding decrease from FY 2019 to FY 2020 is due to decrease in FSM efforts.					
Title: Family of Artillery Munitions (FAM) ***Articles:*** ***Description:*** FAM - Efforts include acquisition planning for future munitions, replacement of existing stockpiles, and providing technologically enhanced artillery munitions in order to mitigate/fill capability gaps in range, accuracy, and lethality and reduce undue logistical burden. Additionally, the program office addresses Weapon System Explosives Safety Review Board (WSESRB) requirements for naval transportation issues for all artillery projectiles, propellants, and fuzes. The M483A1 and M864 155mm DPICM munitions will no longer be authorized for use after 2018 because they fail to meet the 1 percent Unexploded Ordinance (UXO) criteria established by the Department of Defense Policy memorandum dated 19 June 2008 (DoD Policy on Cluster Munitions and Unintended Harm to Civilians). The Marine Corps is interested in solutions that are effective against the same target sets the M483A1 and M864 munitions are designed to engage, this includes: individual area targets dispersed over a defined area, targets whose precise locations are not known, time-sensitive or moving targets, and massed formations of enemy forces. Furthermore, in order to review possible joint development with partner nations the USMC is interested in options compliant with DoD policy and the Convention on Cluster Munitions (CCM) treaty. Solutions which are compliant to DoD Policy on Cluster Munitions but not the CCM treaty are also of interest. ***FY 2019 Plans:*** -Continue to monitor and support joint development with U.S. Army artillery ammunition programs in order to leverage and influence Army developmental efforts. Provide USMC specific safety analysis for Dual Purpose Improved Conventional Munitions (DPICM) replacement munition and Precision Guidance Kit (PGK) 150mm no function software upgrade, and anti-jam development. ***FY 2020 Base Plans:***	0.261 -	0.321 -	1.080 -	0.000 -	1.080 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3098 / *Fire Support System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Conduct additional munitions safety efforts, testing and analysis of results required to achieve type qualification and review board approvals for Dual Purpose Improved Conventional Munitions (DPICM) replacement munition and Precision Guidance Kit Modernization(PGK-M). -Review possible joint munitions development efforts with partner Services and other nations that are compliant with DoD policy and the Convention on Cluster Munitions (CCM) treaty. -Research munitions which are compliant to DoD Policy on Cluster Munitions but not the CCM treaty. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FAM funding line has received $759K baseline increase in FY20. This funding will provide engineering, safety, analytical and administrative efforts required to achieve type qualification and safety review board approval, either by the JSWSR or WSESRB for DPICM replacement munitions.					
Title: Common Laser Range Finder (CLRF) ***Articles:*** ***Description:*** The Common Laser Range Finder Integrated Capability (CLRF IC) is an association of targeting systems that provide handheld, lightweight, man portable devices supporting the employment of air and surface fires. They provide foot mobile users the ability to locate, identify, mark and designate targets in both day and night conditions for engagement by fire support and weapons platforms. CLRF IC systems support the collection and dissemination of targeting information to maneuver, fire support, and intelligence personnel via external digital devices such as the Advanced Field Artillery Tactical Data System (AFATDS) and the Target Handoff System (THS) using associated Combat Net Radios. The CLRF IC includes two major components; The CLRF IC Laser Range Finder(LRF) supports the requirement to locate and transmit targeting information while the Next Generation Hand Held Targeting System (NGHTS)combines the capabilities of the LRF with the ability to designate for specific requirements associated with laser guided munitions. ***FY 2019 Plans:*** Initiate development of the NGHTS to replace current fielded laser designators and spot imager into a single foot mobile capability. ***FY 2020 Base Plans:***	0.473 -	3.167 -	4.711 -	0.000 -	4.711 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue development of NGHTS with completion planned for FY21 ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 is due to increased integration requirements to complete prototyping to support LRIP phase of project.					
Title: Family of Internally Transportable Vehicle (FITV) ***Articles:*** ***Description:*** Family of Internally Transportable Vehicle (FITV) program fields expeditionary vehicles to ground units to support various operations. Provides the Marine Air-Ground Task Force (MAGTF) ground combat units with vehicles transportable in the MV-22 and CV-22 tilt-rotor aircraft as well as the CH53. ***FY 2019 Plans:*** FY19 and out decrease is due to realignment from project 3098, Fire Support Systems, to project 3775 Family of Internally Transportable Vehicles. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	1.550 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: Conventional Ground Ammunition ***Articles:*** ***Description:*** All DoD services are required to field munitions that are insensitive munitions (IM) compliant. IM compliancy is measured by the performance of munitions to six tests; Fast Cook-Off, Slow Cook-Off, Bullet Impact, Fragment Impact, Sympathetic Detonation, and Shape Charge Jet. Services are required to submit IM Strategic Plans annually delineating how they intend on executing their Service IM effort to maximize IM improvements to both new development and legacy conventional ground ammunition. These IM Strategic Plans, Supporting Plan of Actions, and Milestones, with funding trial, are submitted to the JROC, demonstrating each Service's commitment to the continuing effort to improve IM characteristics of Conventional Ground Ammunition, for approval. In order to achieve the system's IM performance, the Conventional Ground Ammunition developer/	0.512 -	0.000 -	0.000 -	0.000 -	0.000 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
owner must have new technology identified and available to address IM shortfalls at the onset of the ammunition development or available for insertion during improvement opportunities for legacy ammunition. Under this program, the USMC invests in IM technology which will improve its existing munitions IM reactions or ability to reliably initiate IM technologies and complies with the OSD mandate for maximum feasible IM compliance. ***FY 2019 Plans:*** Funds transferred to project C3774. ***FY 2020 Base Plans:*** Funds transferred to project C3774. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** N/A					
Accomplishments/Planned Programs Subtotals	5.559	5.999	7.773	0.000	7.773

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/473302: *Fire Support Mods*	4.064	9.741	4.299	-	4.299	4.413	24.548	31.639	31.732	Continuing	Continuing
• PMC/6545: *Family of ITV*	1.266	0.606	0.647	-	0.647	4.019	5.955	8.827	9.004	0.000	140.644
• PMC/473300: *Common Laser Range Finder (CLRF)*	18.196	15.904	12.955	-	12.955	0.982	43.372	23.559	24.429	0.000	146.414

Remarks

D. Acquisition Strategy

These programs range from off-the-shelf modifications to developmental items. Development will typically be conducted at government labs.

Fire Support Mods:
Initiate coordination between the Army's Armament, Research and Development Engineering Center (ARDEC), and MCSC's and NSWC DD science and technology efforts to commence development of the Future Survey System. Continue liaison with the Army's PM TAS in order to leverage future efforts and increase the probability of a joint procurement. Initiate development of a MMIM communications reach back capability to allow for ingestion of meteorological data into artillery firing data for

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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units deployed to austere locations with limited or no bandwidth communications. Procure hardware and software refreshes for the GPSS, MASS and MMIM to ensure compliance with cybersecurity policies, address obsolescence and interoperability with other C2 systems.

Family of Artillery Munitions (FAM):
Program includes artillery munitions which are being developed by the Army. The Army is the lead service for these programs but continues to interact with the FAM IPT to ensure USMC requirements and capability needs are met. This allows the USMC to become users of the munition and certify the round for naval transportation. The munitions include but are not limited to; Dual Purpose Improved Conventional Munitions (DPICM), Precision Guidance Kit (PGK), M1122 High Explosive (HE) and M1123 Infrared (IR) and M1124 Visible Light (VL) 155mm rounds. Each munitions' status is tracked to ensure Marine Corps requirements are satisfied throughout the systems lifecycle.

Common Laser Range Finder (CLRF):
The Common Laser Range Finder Integrated Capability (CLRF IC) will develop the NGHTS to replace current fielded laser designators and spot imager into a single foot mobile capability and implement targeted Engineering Change Proposals into the currently fielded target location device to provide Joint Fires Observers and Joint Terminal Attack Controllers a single lightweight mission defined device that meets future operational requirements and extends the equipment service life to 2035. NGHTS will be procured via a full and open competition.

Family of Internally Transportable Vehicles (FITV):
The FITV program strategy is to explore, research and recommend efforts to address and identify solutions to reliability and safety design issues through government off-the-shelf (GOTS), commercial off-the-shelf (COTS) or modified off-the-shelf (MOTS) components. This includes the efforts to begin to replace the current Family of Internally Transportable Vehicles (FITV) and Utility Task Vehicle (UTV). This effort transfers to 3775.

Conventional Ground Ammunition:
The Conventional Ground Ammunition strategy is to invest in Insensitive Munitions (IM) technologies to address IM shortfalls of priority programs identified in the bi-annual Marine Corps Insensitive Munitions Strategic Plan (IMSP). Once the IM technologies have been successfully demonstrated and matured, the intent is to insert the new technologies into new conventional ground ammunition development as well as provide opportunities to improve legacy munitions IM characteristics. The IM R&D effort directly addresses the mandated OSD requirement to obtain incremental IM improvement in pursuit of becoming fully IM compliant to the maximum extent practicable.

E. Performance Metrics

N/A

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Cumulative Funding	Various	Various : Various	117.783	0.000		0.000		0.000		-		0.000	0.000	117.783	-
FAM Development	WR	NSWC : Dahlgren, VA	0.000	0.000		0.000		0.155	Jan 2020	-		0.155	0.000	0.155	-
CLRF	MIPR	MCSC : MCSC	0.000	0.473	Feb 2018	3.167	Feb 2019	4.711	Feb 2020	-		4.711	Continuing	Continuing	Continuing
Fire Support Mods	WR	NAVSEA : Washington, DC	0.509	0.300	Jul 2018	0.000		0.000		-		0.000	0.000	0.809	-
Conventional Ground Ammunition	MIPR	ARDEC : Picatinny, NJ	1.492	0.000		0.000		0.000		-		0.000	0.000	1.492	-
Fire Support Mods	MIPR	ARDEC : Picatinny, NJ	0.851	1.380	Apr 2018	1.328	Jan 2019	1.011	Nov 2019	-		1.011	0.000	4.570	-
Fire Support Mods	WR	NSWC : Dahlgren, VA	0.729	0.728	Jan 2018	0.390	Jan 2019	0.691	Nov 2019	-		0.691	0.000	2.538	-
Fire Support Mods	WR	MCTSSA : San Diego, CA	0.000	0.000		0.473	Mar 2019	0.000		-		0.000	0.000	0.473	-
Fire Support Mods	MIPR	Army Research Lab : Adelphi, MD	11.346	0.000		0.200	Jan 2019	0.000		-		0.000	0.000	11.546	-
Fires Support Mods (MMIM)	MIPR	Army Research Lab : Adelphi, MD	1.352	0.355	Nov 2017	0.000		0.280	Nov 2019	-		0.280	0.000	1.987	-
		Subtotal	134.062	3.236		5.558		6.848		-		6.848	Continuing	Continuing	N/A

Remarks

CLRF-Increase of 1.544 from FY 2019 to FY 2020 is due to increased integration requirements to complete prototyping to support LRIP phase of project.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	2.615	0.000		0.000		0.000		-		0.000	0.000	2.615	-
FITV Engineering Support	C/CPFF	NATC : Carson City, NV	0.925	1.418	Aug 2018	0.000		0.000		-		0.000	0.000	2.343	-

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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FAM Engineering Support	WR	NSWC : Dahlgren, VA	2.752	0.261	Jan 2018	0.321	Jan 2019	0.225	Jan 2020	-		0.225	0.000	3.559	-
		Subtotal	6.292	1.679		0.321		0.225		-		0.225	0.000	8.517	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FAM DPICM Replacement Munition Testing	C/BA	TBD : TBD	0.000	0.000		0.000		0.700	Jan 2020	-		0.700	0.000	0.700	-
Prior Year Cumulative Funding: Fire Support Mods	Various	Various : Various	8.549	0.000		0.000		0.000		-		0.000	0.000	8.549	-
Fire Support Mods	WR	MCTSSA : San Diego, CA	0.000	0.000	Feb 2018	0.120	Dec 2018	0.000		-		0.000	0.000	0.120	-
FITV Snow Mobility Test	C/BOA	NATC : Carson City, NV	0.229	0.132	Nov 2017	0.000		0.000		-		0.000	0.000	0.361	-
Conventional Ground Ammunition	WR	NSWC : Indian Head, MD	0.059	0.512	Jul 2018	0.000		0.000		-		0.000	0.000	0.571	-
		Subtotal	8.837	0.644		0.120		0.700		-		0.700	0.000	10.301	N/A

Remarks

FAM-Increase of 0.759 from FY 2019 to FY 2020 will provide additional engineering, safety, analytical and testing efforts required to achieve type qualification and review board approvals for Dual Purpose Improved Conventional Munitions (DPICM) replacement munition and Precision Guidance Kit Modernization (PGK-M).

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Cumulative Funding	Various	Various : Various	0.526	0.000		0.000		0.000		-		0.000	0.000	0.526	-
		Subtotal	0.526	0.000		0.000		0.000		-		0.000	0.000	0.526	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	149.717	5.559		5.999		7.773		-		7.773	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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FSML Program Schedule

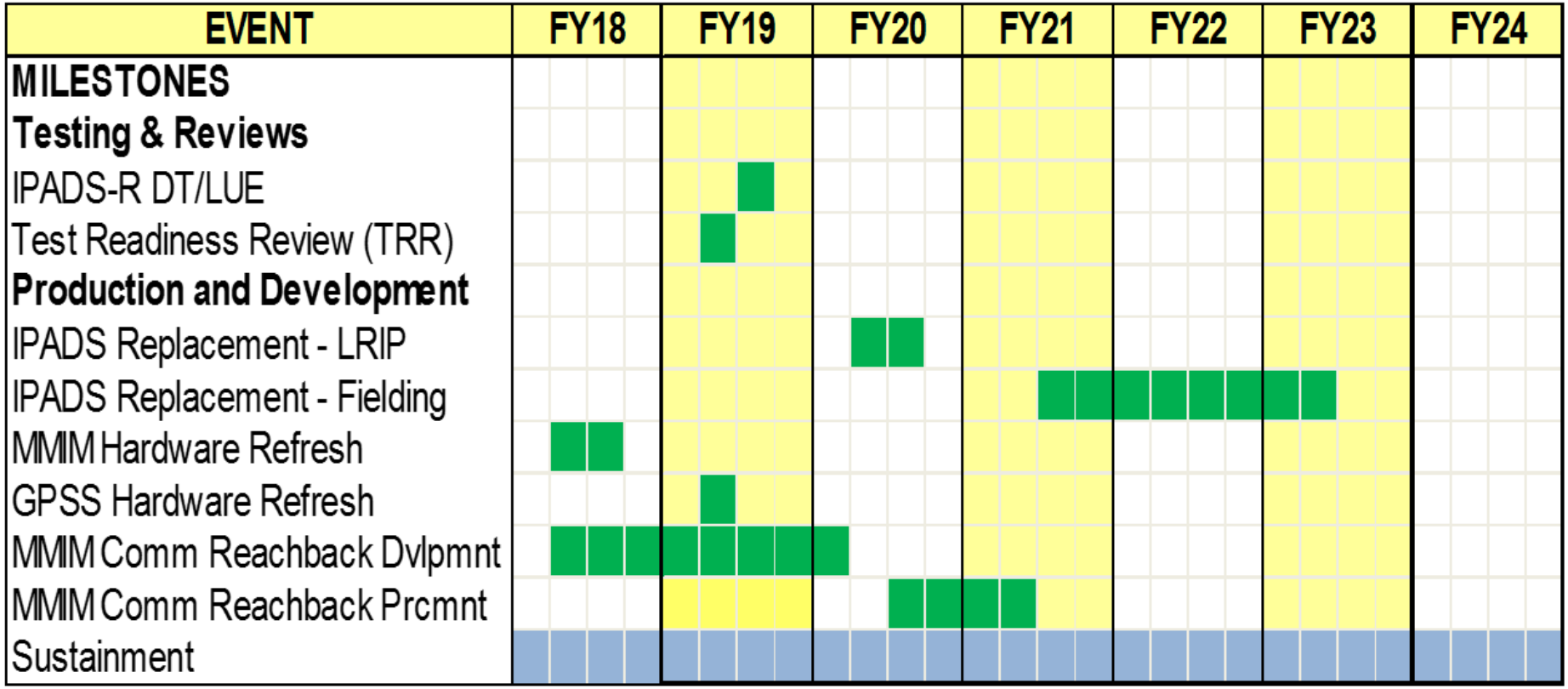
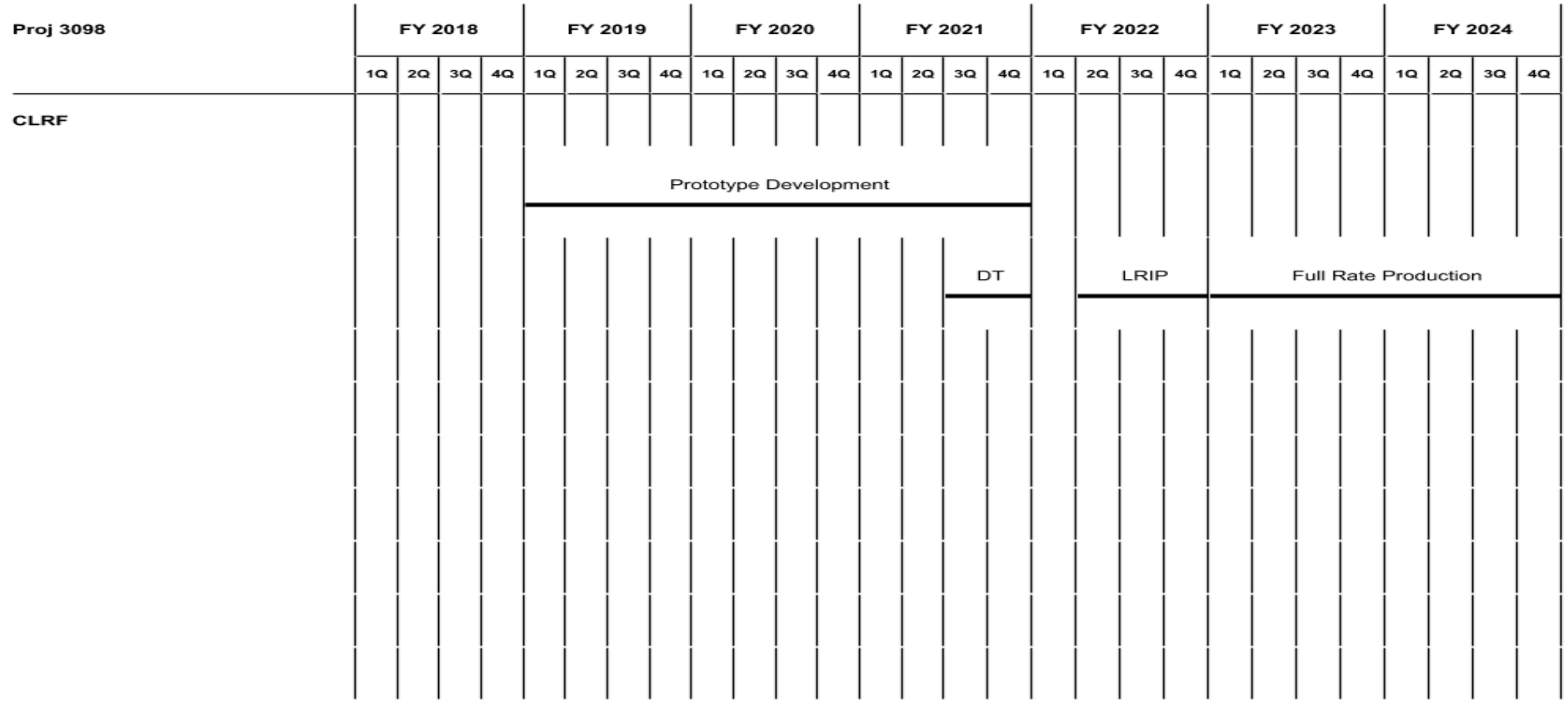


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3098 / *Fire Support System*



2020OSD - 0206623M - 3098

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3098 / *Fire Support System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3098				
CLRF: Prototype Development	1	2019	4	2021
CLRF: DT	3	2021	4	2021
CLRF: LRIP	2	2022	4	2022
CLRF: Full Rate Production	1	2023	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 3774 / *Marine Corps Ammo*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3774: *Marine Corps Ammo*	0.000	0.000	1.321	1.297	-	1.297	1.306	1.314	1.326	1.353	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, Conventional Ground Ammunition funding has been realigned from project 3098, Fire Support Systems to project 3774, Marine Corps Ammo. Realignment of efforts to new projects in FY 19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

Ammunition Life Cycle Management Program supports PM Ammo's responsibility for Total Life Cycle Management for ground conventional munitions. Accordingly, PM Ammo is a member of the joint services Ammunition Logistics Research and Development IPT (ALR&D IPT). Each year the IPT solicits R&D projects from all of the services. The IPT looks for innovative ideas to enhance logistical support for munitions. Approximately 20 Ammo Logistics R&D projects are voted on each year by the IPT. They are prioritized by voting actions of the Senior Review Board and funding sources are identified. Since the funding for ammunition procurement is outpaced by annual expenditures, ammunition logistics R&D projects designed to extend the shelf life of our current inventory, provide enhanced packaging to "lighten the load" of our munitions, and other such projects will go a long way to ensure the Marine Corps can maintain combat readiness with a reliable conventional ammunition inventory into the future.

Conventional Ground Ammunition is a project that identifies and develops Insensitive Munitions (IM) Technologies to address IM shortfalls in new Marine Corps development or improvements to legacy Conventional Ground Ammunition to meet OSD mandated IM compliance requirements. These IM Technology investments directly support the development of the bi-annual Marine Corps Insensitive Munitions Strategic Plan (IMSP) to address the identified IM technology needs of the Marine Corps.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Ammunition Life Cycle Management	0.000	0.803	0.776	0.000	0.776
Articles:	-	-	-	-	-
Description: Ammunition Life Cycle Management Program supports the PM Ammo responsibility for Total Life Cycle Management for ground conventional munitions. Accordingly, PM Ammo is a member of the joint services Ammunition Logistics Research and Development IPT (ALR&D IPT). Each year the IPT solicits R&D projects from all of the services. The IPT looks for innovative ideas to enhance logistical support for munitions. Approximately 20 Ammo Logistics R&D projects are voted on each year by the IPT. They are prioritized by voting actions of the Senior Review Board and funding sources are identified. Since the funding for ammunition procurement is outpaced by annual expenditures, ammunition logistics R&D projects designed to extend the					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3774 / *Marine Corps Ammo*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
shelf life of our current inventory, provide enhanced packaging to "lighten the load" of our munitions, and other such projects will go a long way to ensure the Marine Corps can maintain combat readiness with a reliable conventional ammunition inventory into the future. ***FY 2019 Plans:*** - Continue to support the FY18 projects: Emergency Resupply project & two automated site planning projects - Lightweight Ammunition Packaging (LAP) Project: Develop a lightweight ammunition container that "lightens the load" on individual Marines and saves transportation costs across all modes of transportation. ***FY 2020 Base Plans:*** - Support the following FY20 projects: Loose Ammo Turn-in Machine Project: Develop a "coin star" type device that can rapidly inspect, segregate and count large volumes of small arms cartridges - saves manpower by eliminating the need to physically inspect each cartridge by hand. Repackaging and Remarking project: Provides a better method to repackage ammunition that is returned from the field and supports the rapid shipment of that ammunition back to an ammunition supply point. Ammo Inspection Tools Project: Provides Marines with automated means to count and inspect munitions. Reduces manpower needs and increases inventory accuracy. Pallet Level Tracking Tool Project: Develop a tracking device that can monitor the environmental conditions and location of palletized munitions. Enhances the ability to determine the life expectancy of the munitions based on the environmental exposure experienced by each pallet. Lightweight Ammo Packaging Test: Test the lightweight ammunition container developed in FY19 to determine if the new container meets the specifications of the MIL-STD-1904B. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY2020.					
Title: Conventional Ground Ammunition	0.000	0.518	0.521	0.000	0.521
Articles:	-	-	-	-	-
FY 2019 Plans: The FY19 increase is due to the realignment of funding from project C3098, Fire Support Systems to project C3774, Marine Corps Ammo.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3774 / *Marine Corps Ammo*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue (1) Mk22 Mod 4 (J143) Rocket Motor Slow Cook-off Mitigation (Naval Surface Warfare Center Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD) The FY19 effort will include integration of concept design, hardware fabrication and testing. Initiate (1) LAW FFE Particle Impact Mitigation Sleeve (Armament Research and Development Engineering Command, Picatinny NJ) Optimize PIMS design for LAW FFE M72E10 to improve bullet/fragment impact performance. PIMS technology developed under Joint Insensitive Munitions Technology Program, FY19 funding will be used to optimize the PIMS design for the LAW FFE M72E10 anti-structure munition to improve reaction from bullet and fragment impact threats. OCO: N/A.					
FY 2020 Base Plans: Continue (1) Mk22 Mod 4 (J143) Rocket Motor Slow Cook-off Mitigation (Naval Surface Warfare Center Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD) Complete testing of final configuration to improve slow cook off performance. (2) LAW FFE Particle Impact Mitigation Sleeve (Armament Research and Development Engineering Command, Picatinny NJ) Continue development of PIMS technology for LAW FFE M72E10 rounds to improve bullet/fragment impact performance. FY20 funding will be used to demonstrate final design in live fire and drop tests.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3774 / *Marine Corps Ammo*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
No significant change from FY 2019 to FY 2020.					
Accomplishments/Planned Programs Subtotals	0.000	1.321	1.297	0.000	1.297

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Non Developmental Item/Commercial off the Shelf (NDI/COTS).

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 3774 / *Marine Corps Ammo*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Ammunition Life Cycle Management	MIPR	ARDEC : Picatinny, NJ	0.000	0.000		0.803	Dec 2018	0.776	Oct 2019	-		0.776	Continuing	Continuing	Continuing
Conventional Ground Ammunition	WR	NSWC IHEODTD : Indian Head, MD	0.000	0.000		0.318	Jan 2019	0.321	Mar 2020	-		0.321	Continuing	Continuing	Continuing
Conventional Ground Ammunitionn	WR	ARDEC : Picatinny NJ	0.000	0.000		0.200	Jan 2019	0.200	Mar 2020	-		0.200	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		1.321		1.297		-		1.297	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		1.321		1.297		-		1.297	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3774 / *Marine Corps Ammo*

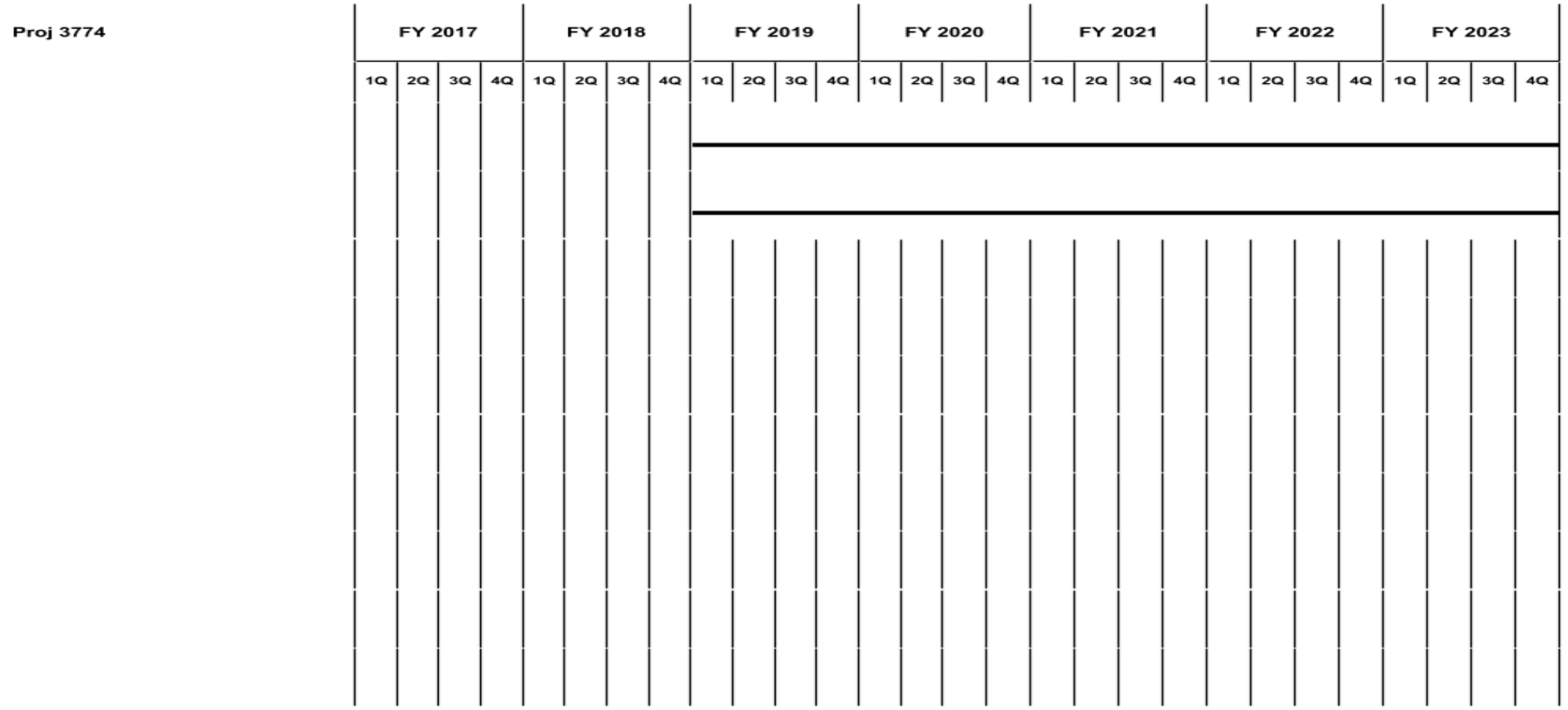


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3774 / *Marine Corps Ammo*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3774				
Ammunition Life Cycle Management - no major milestones	1	2019	4	2023
Conventional Ground Ammunition - no major milestones	1	2019	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 3775 / *Family of Internally Transportable Vehicles (FITV)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3775: *Family of Internally Transportable Vehicles (FITV)*	0.253	0.000	0.245	2.180	-	2.180	2.183	0.235	0.240	0.245	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, Family of Internally Transportable Vehicles funding has been realigned from project 3098, Fire Support Systems to project 3775 Family of Internally Transportable Vehicles. Realignment of efforts to new projects in FY 19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

The Family of Internally Transportable Vehicles (FITV) are light weight and internally transportable in the V-22, CH-53D & CH53E tilt and rotary wing aircraft consisting of the Utility Task Vehicle (UTV)and the future Ultra-Light Tactical Vehicle (ULTV). The FITV provide deployed Marine Air-Ground Task Force (MAGTF) and Marine Expeditionary Unit (Special Operations Capable) (MEU (SOC)) with vehicles that are internally transportable in selected rotary and fixed wing aircraft. The FITV are expeditionary vehicles supporting over-the-horizon amphibious operations, irregular warfare and enhanced company operations. It is fielded to Infantry and Reconnaissance units. Speed, maneuverability, and the use of cover and concealment are the crew's primary means of survival. Efforts have begun to replace the current Family of Internally Transportable Vehicles. This initiative is called the Ultra-Light Tactical Vehicle (ULTV), which will replace the current Utility Task Vehicles (UTV). The ULTV will be a government-off-the shelf (GOTS) or Commercial-Off-the-Shelf (COTS)or modified-off-the-shelf (MOTS) solution that will fulfill the FITV mission of an internally transportable vehicle noted above and is planned to have logistics, communications, and weapons mounted variants. The FY19 to FY20 increase of $1.935M is due to vehicle testing on performance and durability along with operational assessments.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Family of Internally Transportable Vehicles	0.000	0.245	2.180	0.000	2.180
Articles:	-	-	-	-	-
FY 2019 Plans: FITV funding continues the ULTV technology demonstration effort to evaluate commercial vehicle candidates for possible use by the Marine Corps and to identify performance envelopes of currently available COTS base configuration vehicles that are capable of being internally transported.					
FY 2020 Base Plans: FITV funding will test durability and performance requirements for potential ULTV commercial candidates that will be provided from vendors as bid samples, as well as execute an operational assessment to determine					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3775 / *Family of Internally Transportable Vehicles (FITV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Marine Corps suitability and effectiveness. The information gathered during these events will be used as criteria for the ULTV production contract. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY19 to FY20 increase of $1.935M is due to vehicle testing on performance and durability along with operational assessments.					
Accomplishments/Planned Programs Subtotals	0.000	0.245	2.180	0.000	2.180

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/6545: *Ultra-Light Tactical Vehicle (ULTV)*	1.266	0.606	0.647	-	0.647	4.019	5.955	8.827	9.004	0.000	140.644

Remarks

D. Acquisition Strategy

The ULTV program is currently conducting a technology demonstration to evaluate commercial vehicle candidates for possible use by the Marine Corps and to identify performance envelopes of currently available COTS based configuration vehicles that are capable of being internally transported. The final vehicle solution will be determined through full and open competition. Vendors will have the opportunity to respond to a request for proposal (RFP), the government will select three vendors to provide bid samples for testing and operational assessments. The information gathered during these events will be used as criteria for determining the ULTV production contract.

The FITV program strategy is to explore, research and recommend efforts to address and identify solutions to reliability and safety design issues through government off-the-shelf (GOTS), commercial off-the-shelf (COTS) or modified off-the-shelf (MOTS) components.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 3775 / *Family of Internally Transportable Vehicles (FITV)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ULTV Technology Demonstration	C/CPFF	NATC : Carson City, NV	0.000	0.000		0.245	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.245		0.000		-		0.000	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing Events	C/CPFF	NATC : Carson City, NV	0.253	0.000		0.000		1.180	Mar 2020	-		1.180	0.000	1.433	-
Operational Assesment	C/CPFF	NATC : Carson City, NV	0.000	0.000		0.000		1.000	Jun 2020	-		1.000	0.000	1.000	-
		Subtotal	0.253	0.000		0.000		2.180		-		2.180	0.000	2.433	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.253	0.000		0.245		2.180		-		2.180	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3775 / *Family of Internally Transportable Vehicles (FITV)*

Family of Internally Transportable Vehicles

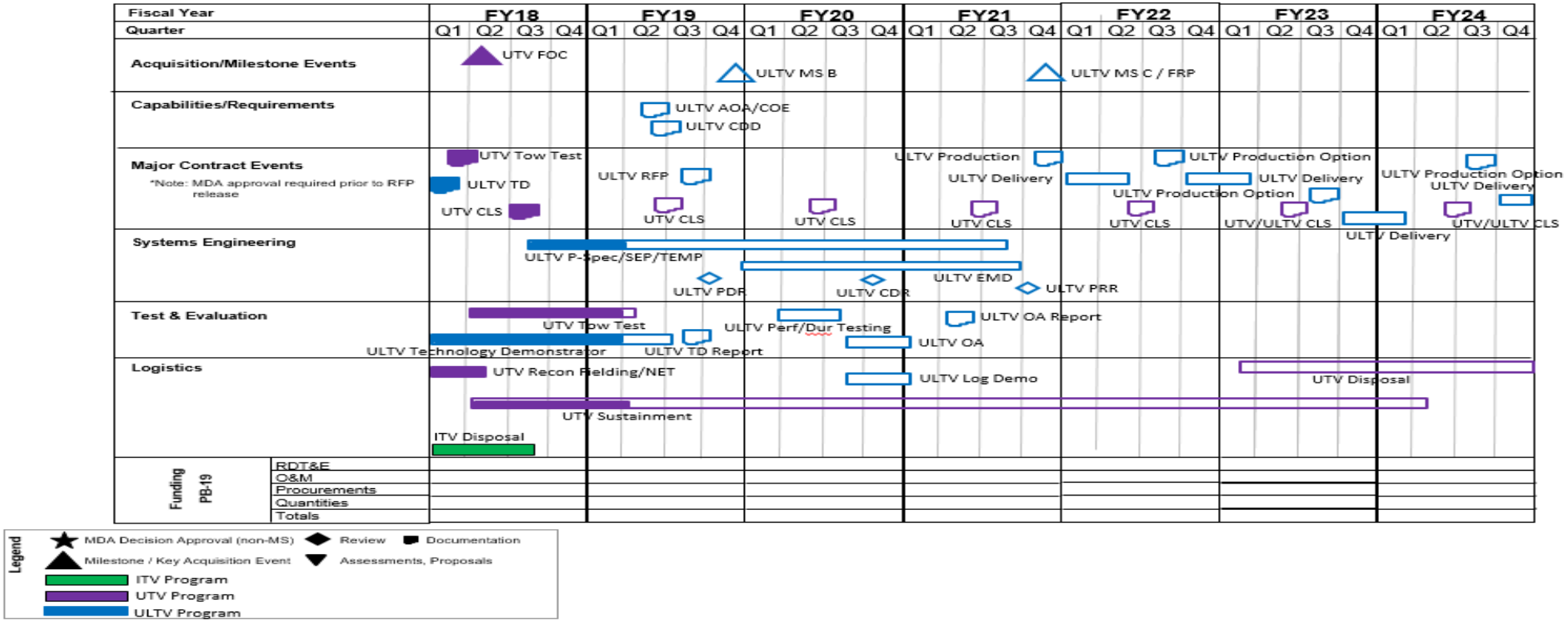


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 3775 / *Family of Internally Transportable Vehicles (FITV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3775				
Proj 3775: ULTV TD	1	2018	4	2019
Proj 3775: Milestone B	4	2019	4	2019
Proj 3775: Milestone C	4	2021	4	2021
Proj 3775: Operational Assesment	3	2020	2	2021
Proj 3775: UTV Tow Test	2	2018	2	2019
Proj 3775: PDR	3	2019	4	2019
Proj 3775: UTV CLS	2	2018	3	2024
Proj 3775: UTV Tow Test Contract	1	2018	2	2018
Proj 3775: ULTV Production Contract Award	4	2021	4	2021
Proj 3775: ULTV CLS Contract Award	3	2023	3	2023
Proj 3775: CDR	4	2020	4	2020
Proj 3775: PRR	4	2021	4	2021
Proj 3775: ULTV Performance/Durability Testing	1	2020	3	2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*				Project (Number/Name) 4002 / *Family of Raid Reconnaissance*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
4002: *Family of Raid Reconnaissance*	1.077	0.526	7.556	1.613	-	1.613	1.842	18.345	22.671	23.124	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project supports multiple airborne/parachuting and specialized reconnaissance related programs focusing on immediate capability enhancements for numerous insertion and personnel equipment shortfalls currently within Marine Reconnaissance and Marine Raider units. These enhancements will improve airborne and amphibious capability,equipment and items for direct action missions, and specialized raid equipment.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Airborne Reconnaissance Equipment (ARE)	0.421	0.427	0.150	0.000	0.150
Articles:	-	-	-	-	-
FY 2019 Plans: - Complete EMMPS/PS-2 system performance and system safety verification. - Continue system/technology upgrades and evaluation of emergent and reliable solutions for challenges in support of MAGTF Joint Force and USSOCOM commanders. RDTE upgrades include the High-Altitude-Opening Navigation System (HAHONAV) and the Parachutist High Altitude Oxygen System. - Continue research, development testing of parachuting capabilities for accessing the battlespace, including High Altitude Low Opening and Low Altitude Personnel Parachutes and related ancillary items.					
FY 2020 Base Plans: - Continue system/technology upgrades and evaluation of emergent and reliable solutions for challenges in support of MAGTF Joint Force and USSOCOM commanders. RDTE upgrades include the High-Altitude-Opening Navigation System (HAHONAV) and the Parachutist High Altitude Oxygen System. - Continue research, development testing of parachuting capabilities for accessing the battlespace, including High Altitude Low Opening and Low Altitude Personnel Parachutes and related ancillary items.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: The decrease of $.277M from FY2019 to FY2020 is due to finalization of testing for EMMPS/PS-2.					
Title: Amphibious Reconnaissance Capability	0.105	0.116	0.302	0.000	0.302

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 4002 / *Family of Raid Reconnaissance*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue research and development of amphibious support equipment in support of MAGTF Joint Force and USSOCOM commanders to maneuver, surface or subsurface operations. Specifically, continue research and development efforts for navigation capabilities of the Diver Reconnaissance Vehicle (DRV). ***FY 2020 Base Plans:*** - Continue research and development of amphibious support equipment in support of MAGTF Joint Force and USSOCOM commanders to maneuver, surface or subsurface operations. - Initiate research and development efforts for navigation capabilities of the Enhanced Diver Propulsion Device (E-DPD). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $.186M from FY2019 to FY2020 is due to the purchase of 1 E-DPD for testing in open water.					
Title: Aerial Delivery and Autonomous Distribution Entry	0.000	7.013	1.161	0.000	1.161
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiate research and development of block upgrades for the Air Delivery Family of Systems for steerable, extended glide systems that can deliver critical supplies when employing standoff or high altitude release for tactical advantage. Research and development will enhance the accuracy of operation in a GPS-denied environment, the interoperability with personnel, the One-Time Use Modular Autonomous Guidance Unit (MAGU), the modularity within aerial delivery systems and various other critical capabilities such as tracking, programming and battery diagnostics. - Initiate research and development of Unmanned Logistics System (ULS)/Aerial Delivery and Autonomous Distribution (A2D2). Specifically, the integration and development of autonomy aspects for a distribution system of support for resupply and air drops. Developed capabilities will also add retrograde and unit to unit transit re-distribution not inherent with air drop alone. Release Engineering, Manufacturing and Development (EMD) contract and Low Rate Initial Production (LRIP) contract aligned to Milestone B and C. Certifications include Information Assurance and Net Ready. ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 4002 / *Family of Raid Reconnaissance*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue research and development of block upgrades for the Air Delivery Family of Systems for steerable, extended glide systems that can deliver critical supplies when employing standoff or high altitude release for tactical advantage. Research and development will enhance the accuracy of operation in a GPS-denied environment, the interoperability with personnel, the One-Time Use Modular Autonomous Guidance Unit (MAGU), the modularity within aerial delivery systems and various other critical capabilities such as tracking, programming and battery diagnostics. - Continue research and development of ULS/A2D2. Specifically, the integration and development of autonomy aspects for a distribution system of support for resupply and air drops. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease of $5.852M from FY2019 to FY2020 is due to ULS-A finalization of Joint Capability Technology Demonstration, Phase I development focused on autonomy and refinement of Common Control Module/Human Machine Interface (CCM/HMI) interfaces.					
Accomplishments/Planned Programs Subtotals	0.526	7.556	1.613	0.000	1.613

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/6518: *Amphibious Support Equipment*	6.230	14.890	7.101	-	7.101	7.181	32.858	52.717	45.640	Continuing	Continuing

Remarks

D. Acquisition Strategy

(U) Airborne Reconnaissance Equipment (ARE) acquisition strategy is to fund engineering changes and product upgrade testing and development for various reconnaissance special purpose equipment for aerial delivery and parachuting, such as the Parachutist's High Altitude Oxygen System (PHAOS); Automatic Activation Device (AAD); and the Tandem Offset Resupply Delivery System (TORDS)/Military Tandem Tethered Bundle (MTTB) System.

(U) Amphibious Reconnaissance Capability acquisition strategy is to fund engineering changes and product upgrade testing and development for various reconnaissance special purpose and lifesaving equipment for Marine Corps diving and small craft, such as the Marine Assault Breacher's Kit (MABK), Marine Individual Assault Kit (MIAK), Diver Propulsion Device (DPD), Combat Rubber Raiding Craft (CRRC) and the Diver Reconnaissance Vehicle (DRV).

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 4002 / *Family of Raid Reconnaissance*

(U) Aerial Delivery and Autonomous Distribution acquisition strategy is to provide a scalable and flexible transportation (delivery, transfer and retrograde) of all classes of supply (I-IX) across the range of military operations (ROMO) for standoff/clandestine operational requirements, such as Joint Precision Air Delivery System (JPADS), conventional and precision Heavy Equipment Air Delivery System (HEADS), conventional and precision Container Delivery System (CDS), Low-Cost Container Delivery System (LCCDS), Low-Cost Cargo Parachutes (LCCP), Family of Cargo Parachutes (FoCP) and Unmanned Logistics Systems (ULS).

E. Performance Metrics

Milestone reviews.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 4002 / *Family of Raid Reconnaissance*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ARE, Various	Various	MCSC : Quantico, VA	0.014	0.000		0.015	Jun 2019	0.000		-		0.000	Continuing	Continuing	Continuing
ARE, Jumper Testing Capability	MIPR	Yuma Proving Ground : Yuma, AZ	0.182	0.000		0.150	Apr 2019	0.000		-		0.000	Continuing	Continuing	Continuing
ARC, MABK and RDOPTS	MIPR	DLA Troop Support : Philadelphia, PA	0.133	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
ARC, A/M Tech Package	WR	NSWC : Carderock	0.000	0.015	Jan 2018	0.000		0.000		-		0.000	0.000	0.015	-
ARC, Battery Chargin Sys	C/FFP	MCSC : Quantico	0.000	0.030	Feb 2018	0.000		0.010	Feb 2020	-		0.010	0.000	0.040	-
ADAD ULS-AIR	Various	NAVAIR : PAX RIVER, MD	0.000	0.000		2.500	May 2019	0.335	May 2020	-		0.335	0.000	2.835	-
ADAD ULS-AIR	MIPR	US Army RDECOm : Natick, MA	0.000	0.000		2.271	May 2019	0.000		-		0.000	0.000	2.271	-
ARC, E-DPD	TBD	MCSC : Quantico, VA	0.000	0.000		0.026	Dec 2018	0.192	Dec 2019	-		0.192	0.000	0.218	-
		Subtotal	0.329	0.045		4.962		0.537		-		0.537	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ARE, Sys Eng Support	C/FFP	MCSC : Quantico, VA	0.500	0.000		0.116	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing
ADAD, Sys Eng Support	C/FFP	MCSC : Quantico, VA	0.000	0.000		0.200	Mar 2019	0.000		-		0.000	0.000	0.200	-
ADAD Sys Eng Support	Various	NAVAIR : PAX RIVER, MD	0.036	0.000		0.400	Mar 2019	0.150	Mar 2020	-		0.150	0.000	0.586	-
ADAD SYS Eng Support	MIPR	US Army RDECOM : Natick, MA	0.000	0.000		0.469	Apr 2019	0.200	Apr 2020	-		0.200	0.000	0.669	-
		Subtotal	0.536	0.000		1.185		0.350		-		0.350	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 4002 / *Family of Raid Reconnaissance*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ARE, Various (travel)	Various	Various : Various	0.104	0.041	Jun 2018	0.043	Sep 2019	0.056	Sep 2020	-		0.056	Continuing	Continuing	Continuing
ARC, DeBatts Testing	WR	NSWC : Carderock	0.009	0.000		0.060	Dec 2018	0.060	Dec 2019	-		0.060	0.000	0.129	-
ARE, PS2 FAT Dummy Drops	MIPR	YPG : Yuma	0.000	0.278	Jun 2018	0.000		0.000		-		0.000	0.000	0.278	-
ARE, EMMPS Jumper Testing	C/FFP	MCSC : Quantico	0.046	0.092	Jun 2018	0.093	Jun 2019	0.094	Jun 2020	-		0.094	0.000	0.325	-
ADAD Software Testing	MIPR	NRSDEC : Natick	0.000	0.000		0.583	Feb 2019	0.000		-		0.000	0.000	0.583	-
ARC, Various (travel)	Various	Various : Various	0.053	0.035	Sep 2018	0.030	Sep 2019	0.040	Sep 2020	-		0.040	0.000	0.158	-
ARC, Dive Tablet	MIPR	DLA Troop Support : Philadelphia, PA	0.000	0.035	Jun 2018	0.000		0.000		-		0.000	0.000	0.035	-
ADAD, ULS-AIR	TBD	NAVAIR : PAX RIVER, MD	0.000	0.000		0.300	Aug 2019	0.250	Aug 2020	-		0.250	0.000	0.550	-
ADAD, ULS-AIR	MIPR	US ARMY, RDECOM : Natick, MA	0.000	0.000		0.300	Aug 2019	0.226	Aug 2020	-		0.226	0.000	0.526	-
		Subtotal	0.212	0.481		1.409		0.726		-		0.726	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1.077	0.526		7.556		1.613		-		1.613	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 4002 / *Family of Raid Reconnaissance*

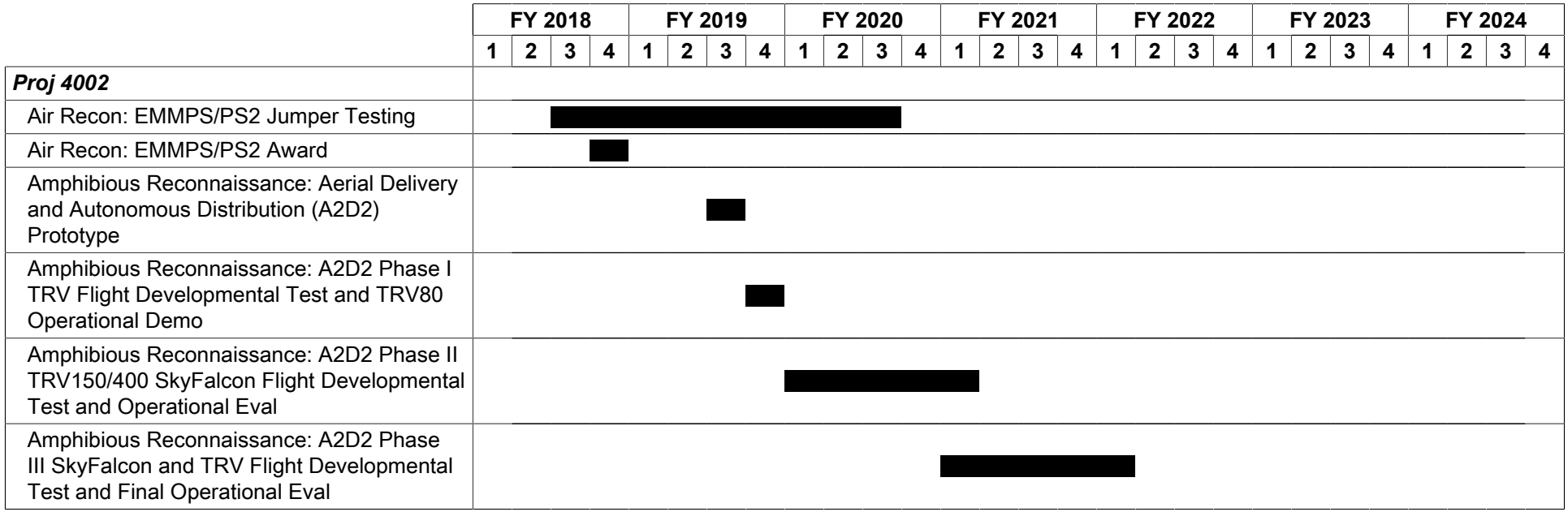


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 4002 / *Family of Raid Reconnaissance*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 4002				
Air Recon: EMMPS/PS2 Jumper Testing	3	2018	3	2020
Air Recon: EMMPS/PS2 Award	4	2018	4	2018
Amphibious Reconnaissance: Aerial Delivery and Autonomous Distribution (A2D2) Prototype	3	2019	3	2019
Amphibious Reconnaissance: A2D2 Phase I TRV Flight Developmental Test and TRV80 Operational Demo	4	2019	4	2019
Amphibious Reconnaissance: A2D2 Phase II TRV150/400 SkyFalcon Flight Developmental Test and Operational Eval	1	2020	1	2021
Amphibious Reconnaissance: A2D2 Phase III SkyFalcon and TRV Flight Developmental Test and Final Operational Eval	1	2021	1	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	5.000	8.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	13.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Provide joint warfighters with lightweight ammunition and packaging savings to reduce the weight carried by personnel and mechanical vehicles. Efforts will also focus on research, prototypes and production solutions with direct impact to weight reduction that increase platform mobility (agility, time on target), increased lethality (carry more ammunition) and reduce combat load (less fatigue).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Polymer Cased Small Arms Ammunitions ***FY 2018 Accomplishments:*** Activities and Tasks required to successfully develop lightweight small caliber cartridge cases, container and link solutions to production. ***FY 2019 Plans:*** N/A	5.000	0.000
Congressional Add: Advanced Lightweight Polymer Cased 7.62mm Ammunition ***FY 2018 Accomplishments:*** N/A ***FY 2019 Plans:*** Activities and Tasks required to successfully develop and transition 7.62 lightweight cartridge case, container and link solutions to production at Lake City Army Ammunition Plant (LCAAP).	0.000	8.000
Congressional Adds Subtotals	5.000	8.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Leverage the Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD(A&S) policy/strategy for Other Transaction Agreements (OTAs) to rapidly assess promising technology regarding Research, Prototypes and Production.

E. Performance Metrics

Milestone reviews and OSD execution benchmarks as defined.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Polymer Cased Small Arms Ammunitions	C/BOA	ARDEC : Picatinny Arsenal, NJ	0.000	4.400	Jun 2019	0.000		0.000		-		0.000	0.000	4.400	-
Lightweight Small Caliber Ammunition (LSCA) Phase IIA	C/BOA	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		0.463	Jun 2019	0.000		-		0.000	0.000	0.463	-
Lightweight Small Caliber Ammunition (LSCA) Phase IIB	C/BOA	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		0.550	Jun 2019	0.000		-		0.000	0.000	0.550	-
Lightweight Links	C/BOA	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		0.600	Jun 2019	0.000		-		0.000	0.000	0.600	-
Accelerated Aging	C/BOA	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		0.872	Jun 2019	0.000		-		0.000	0.000	0.872	-
Propellant Optimization	C/BOA	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		1.000	Jun 2019	0.000		-		0.000	0.000	1.000	-
Metal Injection Molding (MIM) Process Analysis	C/BOA	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		2.000	Jun 2019	0.000		-		0.000	0.000	2.000	-
		Subtotal	0.000	4.400		5.485		0.000		-		0.000	0.000	9.885	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Monitoring	MIPR	NSWC Indian Head : Indian Head, MD	0.000	0.600	Feb 2019	0.000		0.000		-		0.000	0.000	0.600	-
Lightweight Small Caliber Ammunition (LSCA) ARDEC Support	MIPR	ARDEC : Picatinny Arsenal, NJ	0.000	0.000		1.120	Feb 2019	0.000		-		0.000	0.000	1.120	-
Lightweight Small Caliber Ammunition (LSCA) PM MAS Support	MIPR	PM Manuever Ammunition Systems (MAS) : Picatinny Arsenal, NJ	0.000	0.000		0.230	Feb 2019	0.000		-		0.000	0.000	0.230	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	Project (Number/Name) 9999 / *Congressional Adds*	

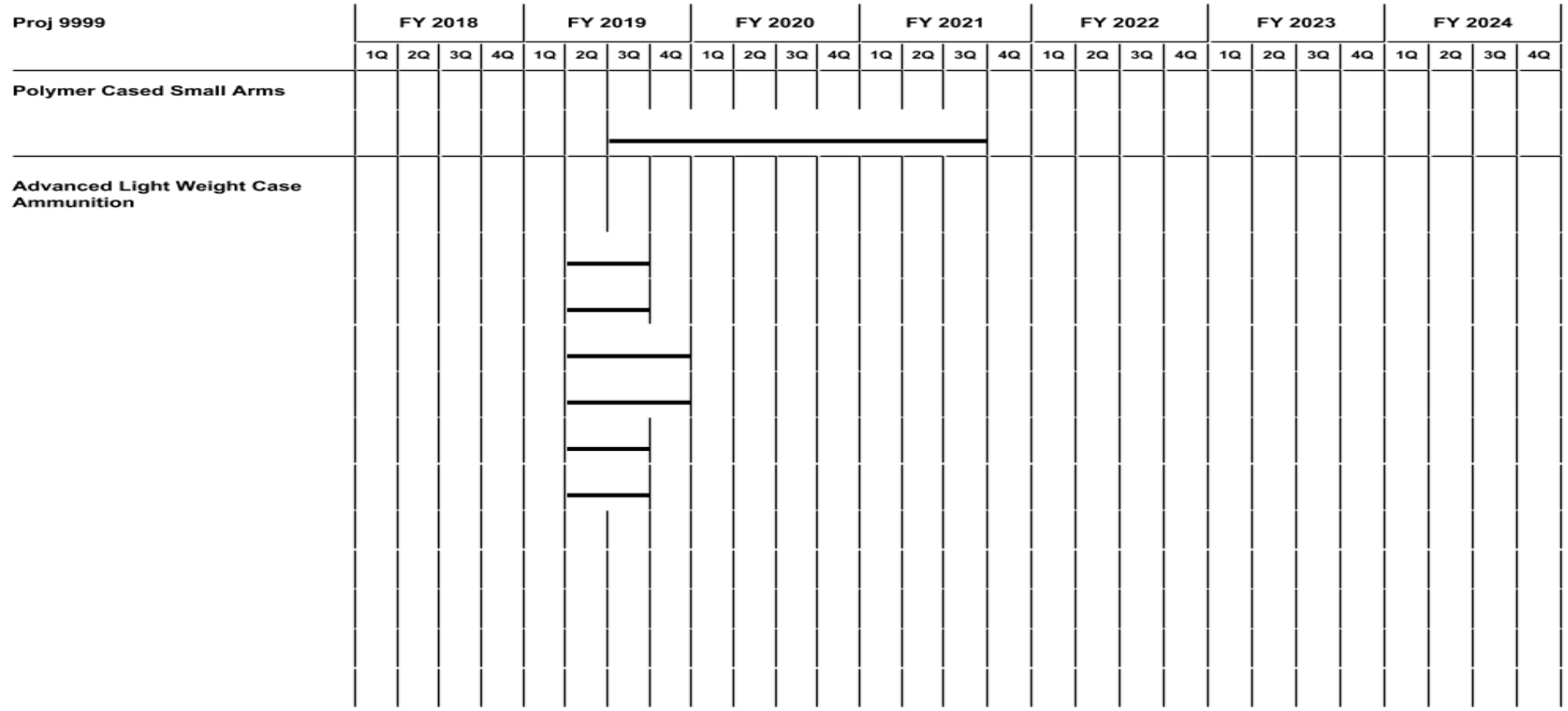
Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Lightweight Small Caliber Ammunition (LSCA) ARL Support	MIPR	US Army Research Laboratory (ARL) : Adelphi, MD	0.000	0.000		0.090	Feb 2019	0.000		-		0.000	0.000	0.090	-
Lightweight Small Caliber Ammunition (LSCA) BSO Support	MIPR	Ballistic Services Office (BSO) : Independence, MO	0.000	0.000		0.075	Feb 2019	0.000		-		0.000	0.000	0.075	-
Lightweight Small Caliber Ammunition (LSCA) ATC Support	MIPR	Aberdeen Test Center (ATC) : Aberdeen Proving Grounds, MD	0.000	0.000		0.600	Feb 2019	0.000		-		0.000	0.000	0.600	-
Lightweight Small Caliber Ammunition (LSCA) USMC Support	MIPR	NSWC Corona : Fallbrook, CA	0.000	0.000		0.400	Feb 2019	0.000		-		0.000	0.000	0.400	-
		Subtotal	0.000	0.600		2.515		0.000		-		0.000	0.000	3.115	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	5.000		8.000		0.000		-		0.000	0.000	13.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 9999 / *Congressional Adds*



2020PB - 0206623M - 9999

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206623M / *MC Ground Cmbt Spt Arms Sys*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Polymer Cased Small Arms: Aging Evaluation - no major milestones	3	2019	3	2021
Advanced Light Weight Case Ammunition: LSCA Phase IIA	2	2019	3	2019
Advanced Light Weight Case Ammunition: LSCA Phase IIB	2	2019	3	2019
Advanced Light Weight Case Ammunition: Lightweight Links	2	2019	4	2019
Advanced Light Weight Case Ammunition: Accelerated Aging	2	2019	4	2019
Advanced Light Weight Case Ammunition: Propellant Optimazation	2	2019	3	2019
Advanced Light Weight Case Ammunition: Metel Injection Molding	2	2019	3	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0206624M *I Marine Corps Cmbt Services Supt*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	262.379	24.915	29.905	37.761	-	37.761	15.573	15.259	14.304	14.590	Continuing	Continuing
0201: *Logistical Veh Sys Replacement (LVSR)*	38.341	0.239	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	38.580
2316: *Combat Service Support Eng Equip*	86.757	18.965	3.375	3.336	-	3.336	3.420	3.499	3.568	3.640	Continuing	Continuing
2509: *Motor Transport Mod*	46.099	0.626	5.267	5.595	-	5.595	1.773	1.816	1.846	1.884	Continuing	Continuing
2510: *MAGTF CSSE & SE*	31.863	3.225	6.015	3.036	-	3.036	4.539	4.445	4.176	4.259	Continuing	Continuing
2929: *Testing Measuring Diag Equip & SE*	10.197	0.588	0.647	0.572	-	0.572	0.626	0.638	0.652	0.664	Continuing	Continuing
3776: *Combat Track Vehicles Mod*	0.000	0.000	14.601	25.222	-	25.222	5.215	4.861	4.062	4.143	Continuing	Continuing
9C90: *MTVR Mod*	49.122	1.272	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	50.394

A. Mission Description and Budget Item Justification

This program element (PE) provides funding for Marine Air-Ground Task Force requirements for Combat Service Support equipment improvement. It will enhance combat breaching capabilities of the ground combat elements, logistics, maintenance and transportation. The PE also provides improvements in all areas of Combat Service Support Equipment Vehicles by determining the replacement for the light fleet of vehicles. This includes projects such as: Alternative Power Sources for Communications Equipment (APSCE) which is a suite of devices that provide the commander with the capability to use existing power to operate his communication equipment, computers and peripheral equipment instead of using batteries or fossil fuel generators; the Marine Corps Family of Automatic Test Systems (ATS), formerly TETS, which provides automatic testing capability for use by technicians both in garrison and forward edge of the battlefield; improvements in all areas of the M1A1 main battle tank, LVSR & MTVR; the High Performance Capabilities for Military Vehicles Project which is dedicated to applying the best practices of the motor sports industry to military vehicles including engineering expertise, equipment, and technology.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0206624M *I Marine Corps Cmbt Services Supt*		
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	25.258	30.156	40.903	-	40.903
Current President's Budget	24.915	29.905	37.761	-	37.761
Total Adjustments	-0.343	-0.251	-3.142	-	-3.142
• Congressional General Reductions	-	-0.251			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.084	0.000			
• SBIR/STTR Transfer	-0.424	0.000			
• Program Adjustments	0.000	0.000	-3.082	-	-3.082
• Rate/Misc Adjustments	0.001	0.000	-0.060	-	-0.060
• Congressional General Reductions Adjustments	-0.004	-	-	-	-

Change Summary Explanation

The FY2020 funding request was reduced by $3.08M to account for the availability of prior year execution balances.

The net increase from FY19 to FY20 can primarily be attributed to the evaluation and integration of active and passive Survivability Layered Systems (i.e. signature management, crew situational awareness, and pre-shot systems) with the ongoing Active Protection System effort (proj. 3776), and a decrease in Mobile Power Equipment Next Gen Power Distribution System (proj. 2510) due to the procurement of the Micro-grid Advance Digital Control System (MADCS).

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 0201 / *Logistical Veh Sys Replacement (LVSR)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0201: *Logistical Veh Sys Replacement (LVSR)*	38.341	0.239	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	38.580
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, LVSR funding has been realigned from project 0201, Logistics Vehicle System Replacement, to project 2509, Motor Transport Mod. Realignment of efforts to new projects in FY19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

The Logistics Vehicle System Replacement (LVSR) is the USMC Marine Air-Ground Task Force (MAGTF) Heavy Lift Capability system. The Medium/Heavy Modification line funds numerous modifications and initiatives that are required to address operational priorities, engineering change proposals, safety concerns, support equipment inefficiencies, product quality deficiencies, and other issues that effect vehicle reliability, availability, maintainability and readiness. A proactive and focused approach ensures proper vehicle sustainment and life cycle management, and it allows the flexibility to develop and implement improvements as needed to respond to the evolving needs of the Marine Corps.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	0.239	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: Details provided in project 2509					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.239	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 0201 / *Logistical Veh Sys Replacement (LVSR)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/5050: *Logistics Vehicle System Replacement*	12.285	3.814	3.087	-	3.087	3.135	2.186	2.230	2.275	Continuing	Continuing
• RDTE/C2509: *Logistics Vehicle System Replacement*	0.000	0.211	0.213	-	0.213	0.218	0.222	0.226	0.231	0.000	1.321

Remarks

BLI 5050 contains multiple programs. LVSR funding only is reflected above.

D. Acquisition Strategy

The Logistics Vehicle System Replacement (LVSR) program is currently in sustainment utilizing RDT&E funding to address required Engineering Change Proposals (ECPs) to maintain relevancy on the battlefield and implement system requirements. LVSR funding in FY 2019 and out realigned to project unit 2509.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 0201 / *Logistical Veh Sys Replacement (LVSR)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LVSR Safety Mod Development	SS/FFP	Various : Various	1.928	0.096	Jun 2018	0.000		0.000		-		0.000	0.000	2.024	-
LVSR ECP Development	SS/FFP	Various : Various	2.054	0.143	Jun 2018	0.000		0.000		-		0.000	0.000	2.197	-
Prior Years Cumulative Funding	C/FFP	Various : Various	17.398	0.000		0.000		0.000		-		0.000	0.000	17.398	-
		Subtotal	21.380	0.239		0.000		0.000		-		0.000	0.000	21.619	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LVSR Engineer Change Support	SS/FFP	Various : Various	1.005	0.000		0.000		0.000		-		0.000	0.000	1.005	-
Prior Years Cumulative Funding	Various	Various : Various	1.648	0.000		0.000		0.000		-		0.000	0.000	1.648	-
		Subtotal	2.653	0.000		0.000		0.000		-		0.000	0.000	2.653	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	11.296	0.000		0.000		0.000		-		0.000	0.000	11.296	-
LVSR Armour Coupon Testing	Various	Not Specified : Aberdeen Test Centyer	0.065	0.000		0.000		0.000		-		0.000	0.000	0.065	-
		Subtotal	11.361	0.000		0.000		0.000		-		0.000	0.000	11.361	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	2.947	0.000		0.000		0.000		-		0.000	0.000	2.947	-
		Subtotal	2.947	0.000		0.000		0.000		-		0.000	0.000	2.947	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	38.341	0.239		0.000		0.000		-		0.000	0.000	38.580	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 0201 / *Logistical Veh Sys Replacement (LVSR)*

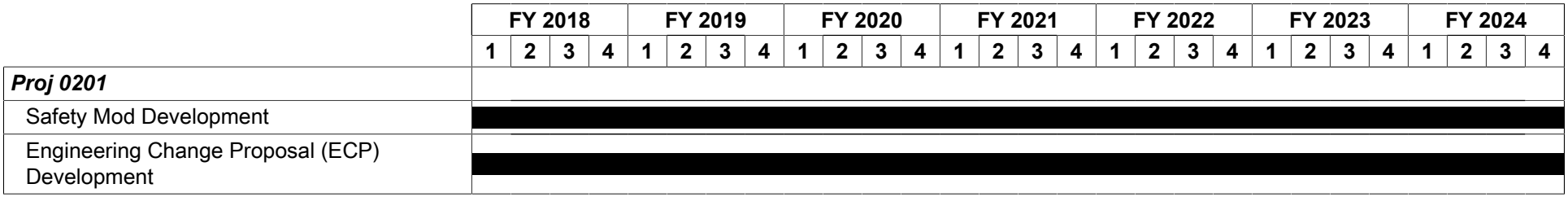

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 0201 / *Logistical Veh Sys Replacement (LVSR)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0201				
Safety Mod Development	1	2018	4	2024
Engineering Change Proposal (ECP) Development	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*				Project (Number/Name) 2316 / *Combat Service Support Eng Equip*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2316: *Combat Service Support Eng Equip*	86.757	18.965	3.375	3.336	-	3.336	3.420	3.499	3.568	3.640	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

M1A1 Mod Kit: The M1A1 Mod Kit effort includes improvements in all areas of the M1A1 main battle tank and the Armored Vehicle Launched Bridge (AVLB). The M1A1 tank provides armor-protected mobile firepower to the Marine Air Ground Task Force (MAGTF). Efforts under the mod line pertaining to the M1A1 include improvements such as: lethality systems, to increase armament accuracy and provide for off-board targeting improvement; survivability systems (including passive and active); communications and command and control; mobility; increasing the crew's situational awareness through sensor enhancements and intra-vehicular data sharing; and environmental testing of components. The AVLB provides the Marine Corps only armor-protected assault gap crossing capability. Continued funding is required to address obsolescence and address operational deficiencies to adapt the tank and AVLB to a changing operational environment and support user-defined product improvements. Funding also supports items such as miscellaneous tools and test items for the M1A1 tank and associated supporting platforms, safety and sustainment modifications to the bridge launcher, and Materiel Fielding Support. M1A1 Mod Kit funding in FY 2019 and out realigned to project unit 3776.

The Engineer Mods and Tool Kits line funds modifications and initiatives which are required to address operational priorities, engineering change proposals, safety concerns, support equipment inefficiencies, product quality deficiencies and other issues that affect equipment reliability, availability and readiness. This approach ensures proper equipment sustainment and life cycle management in response to evolving needs of the Marine Corps fleet. Operational needs to provide personnel survivability on engineer equipment is essential to current and future operations. Research and development funding develops and integrates new lighter, compact armor technology and supports ballistic testing for applications to existing and future acquisitions.

Corrosion Prevention and Control (CPAC): The useful life of Marine Corps assets will be extended through a comprehensive CPAC RDT&E program aimed at identifying and certifying new corrosion control products, materials, processes and procedures for legacy and new acquisitions. The CPAC RDT&E Program works to standardize and substantially improve strategies, objectives and processes to prevent, detect, and treat corrosion and its impacts on Marine Corps ground vehicles and weapons systems. This mission responds to the Congressional directives, DoD and SECNAV instruction to reduce the negative operational effects and associated total ownership cost of Marine Corps ground vehicles and weapons systems.

Assault Bridging Modernization Program: Replaces the legacy M60 armored vehicle and launching system of the current AVLB with the chassis of an M1A1 main battle tank, configured with a modern launching system, to support the launch and recovery of assault bridging in support of MAGTF maneuver. This program will establish commonality across the DoD fleet, eliminates obsolescence and diminishing manufacturing sources and materiel shortfall issues, while increasing the operational effectiveness and readiness of the MAGTF.

The Mine Resistant Ambush Protected (MRAP) Family of Vehicles (FoV) provides tactical mobility for Warfighters with multi-mission vehicles designed to support operational needs and protect personnel from the effects of improvised explosive devices (IEDs), underbody mines, and small arms fire threats. Multiple MRAP

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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vehicle categories (CATs) have been procured, fielded, and sustained: MRAP All Terrain Vehicle (M-ATV) - Combat Operations (ops) in rural, mountainous, urban terrain. Category I - Urban combat operations, ambulance. Category II - Multi-mission ops-convoy lead, troop transport, ambulance, utility vehicle. Category III - Mine/IED clearance ops, explosive ordnance disposal. Operational needs to provide personnel survivability is essential to current and future operations. Research and development funding develops and integrates support efforts such as ballistic glass or other safety issues, new armor technology and ballistic testing. MRAP funding in FY 2019 and out realigned to project unit 2509.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Engineer Mods and Tool Kits	1.089	0.555	0.517	0.000	0.517
Articles:	-	-	-	-	-
FY 2019 Plans: -Continues development, ECPs, and testing in support of Assault Breacher Vehicle (ABV) Modified-Full Width Mine Plow (M-FWMP) prototype, Deep Water Forging Kit (DWFK) and Unmanned Breacher Vehicle (UBV) mine plow drawings and testing. ***FY 2020 Base Plans:*** -Continues M-FWMP, DWFK, and UBV development and testing and ECPs. -Initiates development and testing of ground penetrating capability. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.038M from FY19 to FY20 results from ECP completion in alignment with program plans.					
Title: M1A1 Modifications	14.846	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: M1A1 Mod Kit funding in FY 2019 and out realigned to project unit 3776. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Mine Resistant Ambush Protected Family of Vehicles	0.516	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
Description: MRAP funding in FY 2019 and out realigned to project unit 2509. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Corrosion Prevention and Control (CPAC)	2.514	2.820	2.819	0.000	2.819
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to support the identification, review and testing of new corrosion control products, materials, processes and procedures that impact Marine Corps corrosion control through Science and Technology initiatives such as: Thermally Sprayed Metal Coatings (TSMC), evaluation of the Chemical Agent Resistant Coating (CARC) Systems during Re-Paint, Chip Resistant Coatings, Flexible Nonslip Coatings, and Corrosion Resistant Insulating Foams. - Continue stewardship of Corrosion Prevention Products, and Materials (CPPM) which provides for vendor submissions to the Marine Corps to perform product qualification for chip and abrasion resistant coatings and other Corrosion Prevention Compounds that retard/arrest corrosion. - Continue to support field evaluations, product test and environmental monitoring in advance of fielding and equipment staging programs to determine suitability such as: P19s, Light Capability Rough Terrain Forklift, and environmental monitoring of equipment staging programs in support of Marine Corps Prepositioned Program Norway (MCPP-N) and Marine Expeditionary Units Augmentation Program (MAP) Kuwait. - Continue to implement new technologies, processes and advance materials, and update technical publications to reflect same. - Continue to support field evaluation of equipment and environmental characterization of equipment storage locations such as Norway and Kuwait.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiate review of corrosion prevention products and coatings including metal rich primer, and metal coating eliminating surface preparation. ***FY 2020 Base Plans:*** - Continue to identify, review and support testing of new corrosion control products, materials, processes and procedures that impact Marine Corps corrosion control through Science and Technology initiatives such as: TSMC, evaluation of the CARC Systems during Re-Paint, Chip Resistant Coatings, Flexible Nonslip Coatings and Corrosion Resistant Insulating Foams. - Continue stewardship of CPPM which provides for vendor submissions to the Marine Corps to perform product qualification for chip and abrasion resistant coatings and other Corrosion Prevention Compounds that retard/ arrest corrosion. - Continue field evaluations, product test and environmental monitoring in advance of fielding to determine suitability. - Continue to implement new technologies, processes and advance materials, and update technical publications to reflect same. - Continue to support field evaluation of equipment and environmental characterization of equipment storage locations such as Norway and Marine Forces Europe. - Continue review of corrosion prevention products and coatings including metal rich primer, and metal coating eliminating surface preparation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The program decrease of $0.001M from FY19 to FY20 aligns with the estimated Government Labor rates to allow the program to obtain RDTE activities at Naval Surface Warfare Center-Carderock Division (NSWC-CD).					
Accomplishments/Planned Programs Subtotals	18.965	3.375	3.336	0.000	3.336

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/2061: *M1A1 Modification Kit*	15.918	20.581	20.139	-	20.139	34.568	41.979	53.457	54.529	0.000	958.503
• PMC/7000: *M1A1 Modification Kit*	0.362	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTE,N/C3776: *M1A1 Modification Kit*	0.000	14.242	25.222	-	25.222	4.840	4.479	3.668	3.741	0.000	56.192
• PMC/5050: *MRAP*	0.000	26.630	0.742	-	0.742	1.267	1.291	1.317	1.343	Continuing	Continuing
• PMC/6520: *EOD Systems - MRAP*	5.389	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6,580.859
• PMC/6670: *Items Less than $5M - CPAC and Eng Mods & Tool Kits*	4.953	6.258	4.672	-	4.672	4.376	4.605	4.717	4.819	Continuing	Continuing

Remarks

M1A1 Modification Kit: APS development efforts in FY16-20 enable the planned procurement of APS systems and supporting counter-measures in FY21-22.

EOD Systems - MRAP: BLI 6520 realigned to 5050 beginning in FY19.
MRAP RDTE realigned to 2509 beginning FY19.

D. Acquisition Strategy

(U) The M1A1 modification kits program will leverage Army initiatives to the maximum extent and incorporate modifications to adapt Army solutions to the USMC environment. The USMC will research, develop, and evaluate programs to improve the survivability and lethality of the USMC tank. These efforts include the Abrams Integrated Display and Targeting System (AIDATS), threat detection and warning, situational awareness, survivability, and ownership cost reduction work. The USMC will refine the Active Protection System (APS) technology demonstrator's design in FY18 and FY19 in preparation for live fire testing and evaluation conducted along with the Army in FY20. Procurement of APS systems and supporting counter-measures is planned in FY21 and FY22. M1A1 Mod Kit funding in FY 2019 and out realigned to project unit 3776.

(U) Engineer Mods and Tool Kits: This is a roll-up line of various engineering efforts, modifications and other related items less than $5 Million each. This program provides for significant improvements to various pieces of engineering equipment by enhancing their capabilities and improving readiness.

(U) Assault Bridging Modernization: The program will execute RDT&E in support of transportability testing activities at Aberdeen Test Center for the Assault Bridging Modernization Program.

(U) Corrosion Prevention and Control (CPAC) Program: The Program will execute the RDT&E Program to the Naval Surface Warfare Center - Carderock Division Corrosion Research and Engineering Branch, Naval Research Laboratory and the Tank and Armaments Command for a comprehensive program aimed at identifying, evaluating, and certifying new corrosion control products, materials, processes and procedures for legacy and new acquisitions.

(U) Mine Resistant Ambush Protected (MRAP) FoV: The Program will execute RDT&E funds to research, develop and evaluate survivability and mobility upgrades efforts such as the Cougar Egress Upgrades, Ballistic Glass and Other Safety Issues, New Armor Technology and Ballistic Testing. Work will be accomplished through

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centers of excellence, such as Aberdeen Test Center, Aberdeen, MD, as well as the private sector to conduct research and analysis associated with the development of modifications and modeling and simulation efforts. MRAP funding in FY 2019 and out realigned to project unit 2509.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MRAP Modifications	WR	VARIOUS : VARIOUS	1.131	0.225	Dec 2017	0.000		0.000		-		0.000	0.000	1.356	Continuing
M1A1 Modifications - APS	MIPR	TACOM : Warren, MI	4.438	9.514	May 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
M1A1 Modifications - FEP STS	SS/CPFF	Raytheon : McKinney, TX	0.335	0.400	Aug 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
M1A1 Modifications - FEP Symbology	MIPR	Raytheon : Sacramento, CA	0.563	0.187	Aug 2018	0.000		0.000		-		0.000	0.000	0.750	-
M1A1 Modifications - Laser Upgrade	MIPR	ARDEC : Picatinny, NJ	0.000	0.403	Aug 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
M1A1 Modifications - Communication Mod.	MIPR	SSC LANT : Charleston, NC	0.000	0.200	May 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
M1A1 Modifications - TWMP	MIPR	BENET Labs : Albany, NY	0.000	0.000	Nov 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
M1A1 Modifications - APS / IMOD	MIPR	TACOM : Warren, MI	1.850	1.993	Jan 2018	0.000		0.000		-		0.000	0.000	3.843	Continuing
M1A1 Modifications - APS	C/CPFF	Raytheon : McKinney, TX	0.000	0.743	Mar 2018	0.000		0.000		-		0.000	0.000	0.743	-
M1A1 Modifications - GPS LP	MIPR	MCSC : Quantico, VA	2.556	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MRAP Engineering	WR	ATC : Aberdeen, MD	2.315	0.129	Dec 2017	0.000		0.000		-		0.000	0.000	2.444	Continuing
M1A1 Modifications - AGTS	MIPR	PM TRASYS : Orlando, FL	3.177	0.000	May 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
M1A1 Modifications - AIDATS EMD	MIPR	ABERDEEN PROVING GROUND : Aberdeen, MD	3.465	0.000		0.000		0.000		-		0.000	0.000	3.465	-
M1A1 Modifications - ADL II	MIPR	Picatinny Arsenal : Picatinny, NJ	1.174	1.406	Aug 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prior Year Cumulative. Funding	Various	VARIOUS : VARIOUS	41.469	0.000		0.000		0.000		-		0.000	0.000	41.469	-
		Subtotal	62.473	15.200		0.000		0.000		-		0.000	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 2316 / *Combat Service Support Eng Equip*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

M1A1 Modifications - APS / IMOD: FY17/18 Payments pursuant to adding the United States Marine Corps as a principal organization involved in the Trophy Active Protection System Accelerated Characterization (TAAC) Project Agreement (PA) with the Israel Ministry Of Defense (IMOD).

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CPAC	MIPR	TACOM : Warren, MI	0.525	0.788	Apr 2018	0.825	Apr 2019	0.850	Jan 2020	-		0.850	0.000	2.988	-
CPAC	C/FFP	NSWC-CD : Bethseda, MD	2.473	0.400	May 2018	0.500	Mar 2019	0.518	Jan 2020	-		0.518	0.000	3.891	-
		Subtotal	2.998	1.188		1.325		1.368		-		1.368	0.000	6.879	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MRAP FoV Ballistic Evaluations	MIPR	ATC : Aberdeen, MD	3.246	0.162	Dec 2017	0.000		0.000		-		0.000	0.000	3.408	Continuing
Engineer Modifcation Kits	Various	Various : Various	0.614	1.089	May 2018	0.555	Feb 2019	0.517	May 2020	-		0.517	0.000	2.775	-
CPAC	WR	NSWC-CD : Bethseda, MD	11.810	1.326	Dec 2017	1.495	Nov 2018	1.451	Nov 2019	-		1.451	0.000	16.082	-
Prior Year Cumulative Funding	Various	Various : Various	5.616	0.000		0.000		0.000		-		0.000	0.000	5.616	-
		Subtotal	21.286	2.577		2.050		1.968		-		1.968	0.000	27.881	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	86.757	18.965		3.375		3.336		-		3.336	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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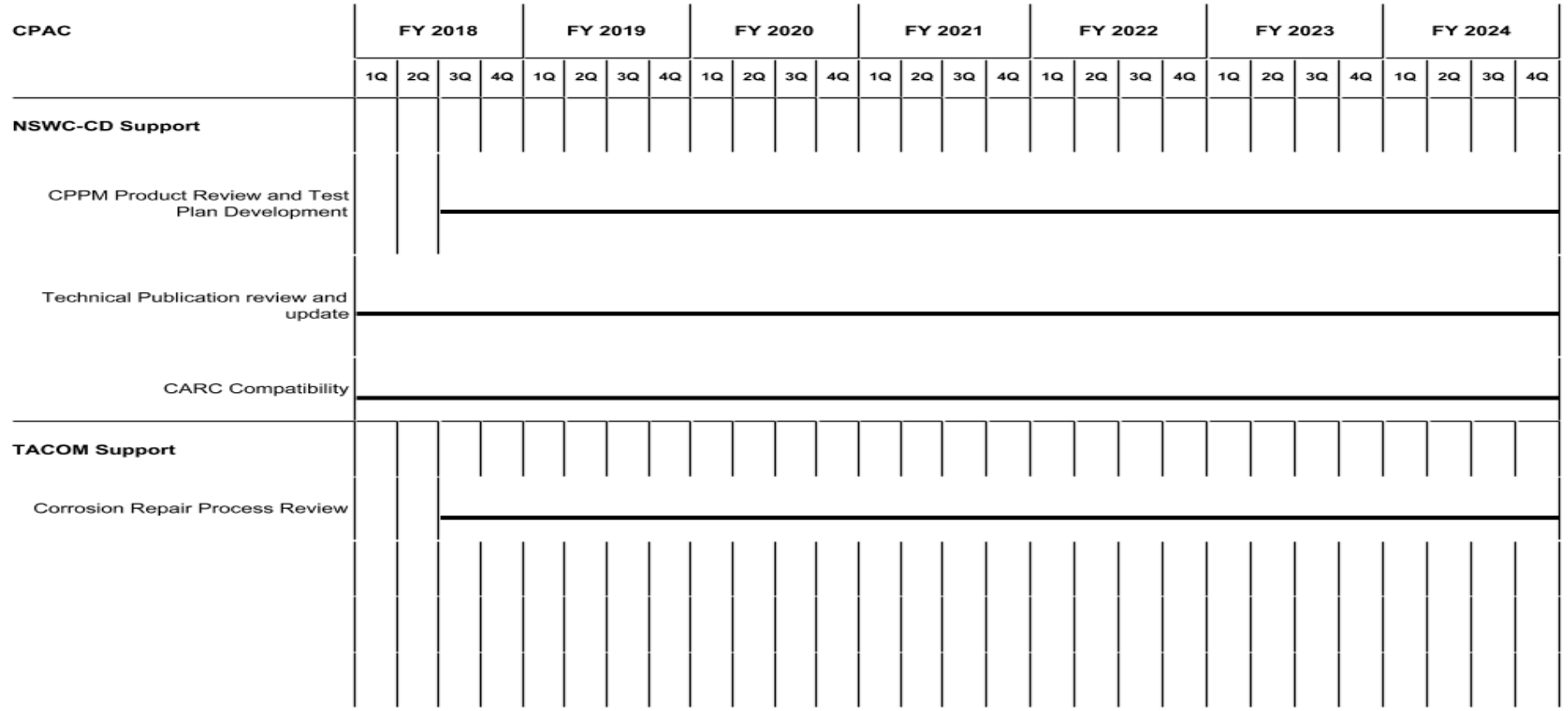

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
CPAC				
NSWC-CD Support: CPPM Product Review and Test Plan Development: Schedule Detail	3	2018	4	2024
NSWC-CD Support: Technical Publication review and update: Schedule Detail	1	2018	4	2024
NSWC-CD Support: CARC Compatibility: Schedule Detail	1	2018	4	2024
TACOM Support: Corrosion Repair Process Review: Schedule Detail	3	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2509: *Motor Transport Mod*	46.099	0.626	5.267	5.595	-	5.595	1.773	1.816	1.846	1.884	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

In FY19, funding for the following programs transitioned into Project 2509 in order to consolidate tactical wheeled vehicle research & development efforts into a single project unit: 0201: Logistics Vehicle System Replacement (LVSR); 9C90: MTVR Mod; 2316: Combat Service Support Eng Equip (Mine Resistant Ambush Protected (MRAP)). Funding for IRV (M88A2) HERCULES moved out of project 2509 to 3776, Combat Track Vehicles Mod.

A. Mission Description and Budget Item Justification

The Marine Corps Tactical Motor Transport Modification (MTM) project manages procurement and life cycle sustainment for more than 25,000 light fleet vehicle and tactical trailer principle end items. A sustained effort is maintained in the Marine Corps for development and testing in support of fleet Service Life Extension Program (SLEP) initiatives, vehicle quality deficiency resolutions, safety initiatives, environmental/state transportation mandated vehicle changes, and system component refresh modification efforts to include addressing deficiencies of HMMWV vehicles due to up armoring and age degradation of the fleet as well as engineering change proposals identified for the Utility Task Vehicle. Since transportation asset operational availability declines at a steady rate over time, SLEP, fleet overhauls, and enhanced depot level modifications are essential in maintaining a viable transportation capability in the Marine Corps Operating Forces.

The Improved Recovery Vehicle (M88A2) Modification program funds research, development and testing of improvements in all areas of the M88A2 vehicle, which provides the MAGTF heavy combat recovery capability. Funding addresses obsolescence and Engineering Change Proposals (ECPs) to improve performance and develop safety related ECPs to correct hazards noted during the standard day to day operation of the M88A2 IRV.

P-19 Replacement (P-19R) is replacing the obsolete A/S32P-19A Crash Fire Rescue fleet in support of expeditionary airfield operations and the supporting establishment. The vehicle is outfitted with advanced fire suppression equipment. It provides rescue and aircraft fire fighting capabilities to permanent and expeditionary airfields throughout the Marine Corps. The P-19 Replacement is also employed to fight structural fires in support of base camps and as firefighting support to other elements of the Marine Air Ground Task Force (MAGTF), such as ammunition supply points, Petroleum, Oil and Lubricant (POL) distribution points or hazardous material storage facilities.

The Family of Trailers & Ancillary Equipment (FT&AE) management strategy will use RDT&E funding to explore current and new technological options that can be used to achieve optimum lift within the desired weight and cube constraints in support of the "Lightening the MAGTF" initiative, as well as sustaining and/or improving capabilities, to include re-engineering the ground clearance on various trailers to improve off-road mobility. Transportation and expeditionary goals will be considered in the research and development for the light and medium/heavy trailer fleet to include (but not limited to) the M1076 PLS (Palletized Load System) Trailer, MK1077 Flatrack, MTVR Trailer, M870 40/50 Ton Low Bed, MK970 Tactical Refueler and the Flatrack Refueler Capability (FRC).

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2509 / *Motor Transport Mod*

The Medium Tactical Vehicle Replacement (MTVR) Modification program line funds numerous modifications and initiatives required to address operational priorities, engineering change proposals, safety concerns, support equipment and other issues that affect vehicle reliability, availability, maintainability, readiness, as well as energy efficiency. A proactive and focused approach ensures proper vehicle sustainment and life-cycle management and allows the program office to develop and implement improvements as required to respond to the evolving needs of the Marine Corps. For example, the Technology Demonstrator effort will continue to explore and develop strategies and products to extend the life of the MTVR to 2042 from its original planned exit date of 2024. The MTVR Technology Demonstrator provides the opportunity to integrate critical upgrades which could be included into a Service Life Extension Program (SLEP). These upgrades would include improvements in fuel consumption, long-term maintainability and improved safety and crew survivability. The PMO is working with PM Fires to procure HIMARS Resupply Vehicles in support of standing up a new HIMARS Battalion by FY22.

The Logistics Vehicle System Replacement (LVSR) is the Marine Air-Ground Task Force (MAGTF) Heavy Lift Capability system. This line funds numerous modifications and initiatives that are required to address operational priorities, engineering change proposals, safety concerns, support equipment and other issues that effect vehicle reliability, availability, maintainability and readiness. A proactive and focused approach ensures proper vehicle sustainment and life cycle management and allows the flexibility to develop and implement improvements as required to respond to the evolving needs of the Marine Corps.

The Mine Resistant Ambush Protected (MRAP) Family of Vehicles (FoV) provides tactical mobility for Warfighters with multi-mission vehicles designed to support operational needs and protect personnel from the effects of improvised explosive devices (IEDs), underbody mines and small arms fire threats. Multiple vehicle categories (CATs) have been procured, fielded and sustained: MRAP All Terrain Vehicle (M-ATV) - Combat Operations (ops) in rural, mountainous, urban terrain. Category I - Urban combat operations, ambulance. Category II - Multi-mission ops-convoy lead, troop transport, ambulance, utility vehicle. Category III - Mine/ IED clearance ops, explosive ordnance disposal. Operational needs to provide personnel survivability is essential to current and future operations. Research and Development funding develops and integrates support efforts such as ballistic glass and other safety issues, new armor technology and ballistic testing.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: IRV (M88A2) HERCULES	0.209	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: P-19 Replacement	0.200	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2509 / *Motor Transport Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Medium Tactical Vehicle Replacement (MTVR)	0.000	3.672	3.949	0.000	3.949
Articles:	-	-	-	-	-
FY 2019 Plans: - Continuing to support the initiatives aligning with the Commandant of the Marine Corps (CMC) priority for reducing energy costs, logistics footprint, and an improved environment. - Continuing the Test & Evaluation efforts supporting ECP/safety mods of the MTVR as required to provide survivability upgrades in response to continual changes in the threat environment to protect the warfighter and vehicle from possible catastrophic events, in order to meet current and future operations. - Design, build and test an MTVR Technology Demonstrator to inform the Marine Corps of potential ways to modernize the MTVR FoV through a potential Service Life Extension Program (SLEP). The Marine Corps made the decision to extend the service life of the MTVR fleet from 2024 out to 2042. This cannot be done without modernizing the platform. The first step is to inform USMC leadership as to "the art of the possible". The Technology Demonstrator will be a two-year effort, using an armored MTVR, built with 1990s technology, and apply modern technologies. These technologies will include a light weight armored cab, a modern engine, transmission and transfer case, electronic stability control, and an updated secure data bus. This will demonstrate how to "buy back" capability lost through age, after-market armoring and C4I applications, and will address parts obsolescence. The Technology Demonstrator will provide a range of options to USMC leadership to help determine a path forward in ensuring the platform will remain viable for an additional 22 years beyond its initially planned exit date of 2024. - Initiate conduct of a Service Life Extension Program (SLEP) Business Case Analysis (BCA) to explore and develop upgrades that will extend the MTVR from 2024 out to 2042. ***FY 2020 Base Plans:*** - Continue to support the initiatives aligning with the Commandant of the Marine Corps (CMC) priority for reducing energy costs, logistics footprint, and an improved environment.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue Test & Evaluation efforts supporting ECP/safety mods of the MTVR as required to provide survivability upgrades in response to continual changes in the threat environment to protect the warfighter and vehicle from possible catastrophic events, in order to meet current and future operations. - Continue to design, build and test an MTVR Technology Demonstrator to inform USMC leadership on how to improve the MTVR platform and extend its service life from 2024 out to 2042. - Conduct ECP/safety mods of the MTVR as required. - Continue SLEP BCA. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY19 to FY20 increase of $0.277M supports ECP safety mods of the MTVR as required and testing the MTVR Technology Demonstrator to extend the platform's service life from 2024 out to 2042.					
Title: Motor Transport Modification (MTM)	0.002	0.653	0.675	0.000	0.675
Articles:	-	-	-	-	-
FY 2019 Plans: Continue to evaluate, test, and integrate system modifications for the Legacy Light Fleet to support durability and performance testing. ***FY 2020 Base Plans:*** FY20 funds will support the development of engineering change proposals, including HMMWV body mounts and Chassis upgrades in support of the HMMWV/Utility Task Vehicle modifications as identified by feedback from users in operational environments. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY19 to FY20 increase ($.022M) is due to additional investment in the continuation of the Light Tactical Vehicle safety and reliability efforts (such as addressing those associated with deficiencies of HMMWV vehicles due to up armoring and degradation).					
Title: Combat Service Support Eng Equip MRAP	0.000	0.526	0.549	0.000	0.549
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2509 / *Motor Transport Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Mine Resistant Ambush Protected (MRAP) Vehicles funding profile is realigned in this PE from Project 2316 to Project 2509 for FY19 and future fiscal years. Continue research and development of Engineering Change Proposals (ECPs) efforts such as "material improvements" to ballistic glass, other safety issues and new armor ballistic testing in support of survivability and mobility upgrades. ***FY 2020 Base Plans:*** Will continue research and development of Engineering Change Proposals (ECPs) efforts such as "material improvements" to ballistic glass, other safety issues and new armor ballistic testing in support of survivability and mobility upgrades. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY19 to FY20 increase of $0.23M provides Engineering Change Proposals (ECP) for material improvements to ballistic glass and other safety issues in support of survivability and mobility upgrades.					
Title: Family of Trailers & Ancillary Equipment	0.215	0.205	0.209	0.000	0.209
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue M870 and MK593 Piano Hinge testing efforts to ensure effectiveness of the Medium/Heavy Tactical Trailers designed for the Medium Tactical Vehicle replacement (MTVR)/Logistics Vehicle System Replacement (LVSR), enabling the fleet to meet increasing mobility requirements. ***FY 2020 Base Plans:*** - Will Continue MK870 testing efforts to ensure effectiveness of the Medium/Heavy Tactical Trailers designed for the Medium Tactical Vehicle replacement (MTVR)/Logistics Vehicle System Replacement (LVSR), enabling the fleet to meet increasing mobility requirements. - Will conduct Trailer Transportability recertification with the Ground Clearance mitigation ECP. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY19 to FY20 increase of $.004M provides for the Trailer Transportability recertification with the Ground Clearance mitigation ECP.					
Title: Logistics Vehicle System Replacement	0.000	0.211	0.213	0.000	0.213
Articles:	-	-	-	-	-
FY 2019 Plans: LVSR funding profile was realigned into this PE from Project 0201 to Project 2509 for FY19 and future fiscal years. - Conduct improved floor and blast mitigation seat modifications. ***FY 2020 Base Plans:*** -Will continue improved floor and blast mitigation seat modifications. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY19 to FY20 increase of $.002M provides for efforts to conduct improved floor and blast mitigation seat modifications.					
Accomplishments/Planned Programs Subtotals	0.626	5.267	5.595	0.000	5.595

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/5097: *Family of Tactical Trailers*	1.668	2.393	2.693	-	2.693	3.146	10.209	3.283	3.349	Continuing	Continuing
• PMC/2061-01: *M88A2 HERCULES Mod*	3.860	2.323	2.621	-	2.621	3.067	3.292	3.189	3.253	Continuing	Continuing
• PMC/5050-01: *Motor T Mod/MTVR*	7.477	7.147	14.501	-	14.501	8.362	8.514	8.699	8.873	Continuing	Continuing
• RDTE,N/C3776: *M88A2 HERCULES Mod*	0.000	0.359	0.367	-	0.367	0.375	0.382	0.394	0.402	0.000	2.279
• PMC/5050-02: *Motor T Mod/LVSR*	12.297	3.814	3.087	-	3.087	3.135	2.186	2.230	2.275	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/0206624M/9C90: *MTVR Mod*	1.272	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	50.394
• PMC/5050-03: *Motor T Mod/MTM*	3.598	0.000	0.542	-	0.542	0.560	3.505	3.575	3.647	Continuing	Continuing
• PMC/5050-04: *Motor T Mod/MRAP*	0.000	0.710	0.742	-	0.742	1.267	1.291	1.317	1.343	Continuing	Continuing
• PMC/5050-05: *Motor T Mod/P19-R*	0.000	0.240	0.362	-	0.362	0.367	0.378	0.386	0.394	Continuing	Continuing
• PMC/5006: *Commercial Cargo Vehicles*	10.771	10.295	10.444	-	10.444	11.434	13.366	13.480	13.750	Continuing	Continuing
• PMC/6520: *EOD Systems*	25.281	45.962	43.360	-	43.360	20.597	30.009	21.090	21.530	Continuing	Continuing

Remarks

Significant changes in the Other APPN/LI is the FY 2019 realignment of the following:
MRAP and P-19R PMC funding was realigned to PMC BLI 5050
LVSR, MTVR and MRAP RDTEN funding was realigned to Project Unit 2509
HERCULES RDTEN funding was realigned to Project Unit 3776

FY19 Overseas Contingency Operations (OCO) funding for MTVR, LVSR and MRAP is reflected in the BLI 5050 funding lines for each program as they have been broken out.

D. Acquisition Strategy

The IRV (M88A2) program leverages Army developmental projects to create a system that more readily meets Marine Corps Heavy Recovery Vehicle requirements. Improvements include modifications addressing safety, reliability, and technology upgrades.

The P-19 Replacement leverages COTS and NDI components in an effort to minimize costs, test requirements, and reduce development time. P-19R supplants the aging A/S32P-19A fleet in support of expeditionary airfield operations and the supporting establishment. The vehicle is outfitted with advanced fire suppression equipment. It provides rescue and aircraft fire fighting capabilities to permanent and expeditionary airfields throughout the Marine Corps. The P-19 Replacement is employed to fight structure fires in support of base camps and as firefighting support to other elements of the MAGTF, such as ammunition supply points, Petroleum, Oil, and Lubricants (POL) distribution points, or hazardous material storage facilities. The P-19R ordering period with Oshkosh Defense expired May 2018. The full AAO of 164 has been procured.

Motor Transport Modification (MTM) funding will focus on streamlined acquisitions of Commercial-Off-The-Shelf/Non-Developmental Items (COTS/NDI) that can be identified, integrated, and tested in a short amount of time. MTM funding will be used for modifications required to increase MTM fleet readiness, safety and reliability. Successful modifications and tests are intended for follow-on procurement and incorporation into existing system component upgrades, SLEPs, or rapid COTS/NDI fielding for the Fleet Marine Forces (FMF).

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2509 / *Motor Transport Mod*

The Family of Trailers & Ancillary Equipment (FT&AE) management strategy will use RDT&E funding to explore current and new technological options that can be used to achieve optimum lift within the desired weight and cube constraints in support of the "Lightening the MAGTF" initiative, as well as sustaining and/or improving capabilities, such as re-engineering the ground clearance on various trailers. Transportation and expeditionary goals will be considered in the research and development for the light and medium/heavy trailer fleet to include (but not limited to) the M1076 PLS (Palletized Load System) Trailer, MK1077 Flatrack, MTVR Trailer, M870 40/50 Ton Low Bed, MK970 Tactical Refueler and the Flatrack Refueler Capability (FRC).

The Marine Corps made the decision to extend the service life of the MTVR fleet from 2024 out to 2042. This cannot be done without modernizing the platform. A Business Case Analysis (BCA) will assess the current status of the MTVR fleet and provide recommendations on what should be done to extend the platform's service life. The next step will be to design, build and test an MTVR Technology Demonstrator (MTVR TD), which will begin concurrently, while incorporating lessons learned from the BCA. The MTVR TD will insert applicable modern technologies to address parts obsolescence, safety concerns, and respond to emerging threats. This will be a two-year design, build and test effort, that includes technology insertions such as a light weight armored cab, a modern engine, transmission and transfer case, electronic stability control, and an updated secure data bus. At the conclusion of the MTVR TD Phase, Marine Corps leadership will have the required information needed to make an informed decision on the economical and effective ways to modernize the platform and extend its service life.

The Logistics Vehicle System Replacement (LVSR) Program is currently in sustainment utilizing RDT&E funding to address required Engineering Change Proposals (ECPs) to maintain relevancy on the battlefield and implement system requirements.

The Mine Resistant Ambush Protected (MRAP) FoV: The Program will execute RDT&E funds to research, develop, and evaluate survivability and mobility upgrades efforts such as the Cougar Egress Upgrades, Ballistic Glass and Other Safety Issues, New Armor Technology and Ballistic Testing. Work will be accomplished through centers of excellence, such as Aberdeen Test Center, Aberdeen, MD, as well as the private sector to conduct research and analysis associated with the development of modifications and modeling and simulation efforts.

E. Performance Metrics

Program / Technical Reviews
Fuel Efficiency SVR FY 2019 1Q
Fuel Efficiency ECP Approval FY2019 1Q

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IRV (M88A2) HERCULES	MIPR	TACOM : Warren, MI	2.316	0.209	Apr 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MRAP Modifications	WR	Various : Various	0.000	0.000		0.188	Dec 2018	0.203	Dec 2019	-		0.203	0.000	0.391	-
MRAP Engineering	WR	ATC : ATC	0.000	0.000		0.129	Dec 2018	0.135	Dec 2019	-		0.135	0.000	0.264	-
LVSR	MIPR	Various : Various	0.000	0.000		0.211	Feb 2019	0.213	Feb 2020	-		0.213	0.000	0.424	-
MTVR SLEP Development	C/FFP	OSHKOSH : Oshkosh, WI	0.000	0.000		0.000		0.588	Dec 2019	-		0.588	Continuing	Continuing	Continuing
MTVR SLEP Research and Development	MIPR	TARDEC : Warren, MI	0.000	0.000		2.446	Dec 2018	2.809	Dec 2019	-		2.809	Continuing	Continuing	Continuing
Prior Years Cumulative Funding	Various	Various : Various	30.500	0.000		0.000		0.000		-		0.000	0.000	30.500	19.769
		Subtotal	32.816	0.209		2.974		3.948		-		3.948	Continuing	Continuing	N/A

Remarks

MRAP realigned from project code 2316 to 2509 FY19 and out.
LVSR realigned from project code 0201 to 2509 FY19 and out.
MTVR realigned from project code 9C90 to 2509 FY19 and out. Increase from FY19 to FY20 is to support the development of the Technology Demonstrator for the SLEP.
HERCULES realigned from project code 2509 to 3773 FY19 and out.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
P19 Reliability Testing	C/BOA	NATC : Carson City, NV	0.609	0.200	Dec 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
FTT Durability Test/ Analysis	WR	NRL : Washington, DC	0.185	0.215	Nov 2017	0.205	Dec 2018	0.209	Dec 2019	-		0.209	Continuing	Continuing	Continuing
MRAP FoV Ballistic Evaluations	MIPR	ATC : ATC	0.000	0.000		0.209	Dec 2018	0.211	Dec 2019	-		0.211	0.000	0.420	-
MTM (Light) ECPs	C/CPFF	NATC : Carson City, NV	0.000	0.000		0.000		0.675	Feb 2020	-		0.675	0.000	0.675	-
MTM (Light)Testing/ Analysis	C/BA	NATC : Carson City, NV	0.413	0.002	Sep 2018	0.653	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MTVR FE Testing and FUE	MIPR	ATC : Aberdeen,MD	0.000	0.000		0.226	Nov 2018	0.000		-		0.000	0.000	0.226	-
MTVR ECP Test & Evaluation	Various	Various : Various	0.000	0.000		0.600	Dec 2018	0.152	Dec 2019	-		0.152	0.000	0.752	-
MTVR ATC Testing	MIPR	ATC : Aberdeen, MD	0.000	0.000		0.400	Nov 2018	0.400	Nov 2019	-		0.400	0.000	0.800	-
Prior Years Cumulative Funding	Various	Various : Various	11.290	0.000		0.000		0.000		-		0.000	0.000	11.290	-
		Subtotal	12.497	0.417		2.293		1.647		-		1.647	Continuing	Continuing	N/A

Remarks

MTM (Light) testing/analysis increase of $0.022 in FY20 will support testing of improvements related to safety and reliability of Light Tactical Vehicles for quality deficiency resolutions, safety initiatives, and system component refresh modification efforts.
MTVR ECP Testing decrease from FY19 to FY20 is to realign funding to higher requirement of Technology Demonstrator development.
The FY19 to FY20 increase of $.004M provides for efforts such as the Trailer Performance Test/Durability Analysis (rust/corrosion) and Ground Clearance mitigation solution.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	0.786	0.000		0.000		0.000		-		0.000	0.000	0.786	-
		Subtotal	0.786	0.000		0.000		0.000		-		0.000	0.000	0.786	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	46.099	0.626		5.267		5.595		-		5.595	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2509 / *Motor Transport Mod*

MTVR Program Plan

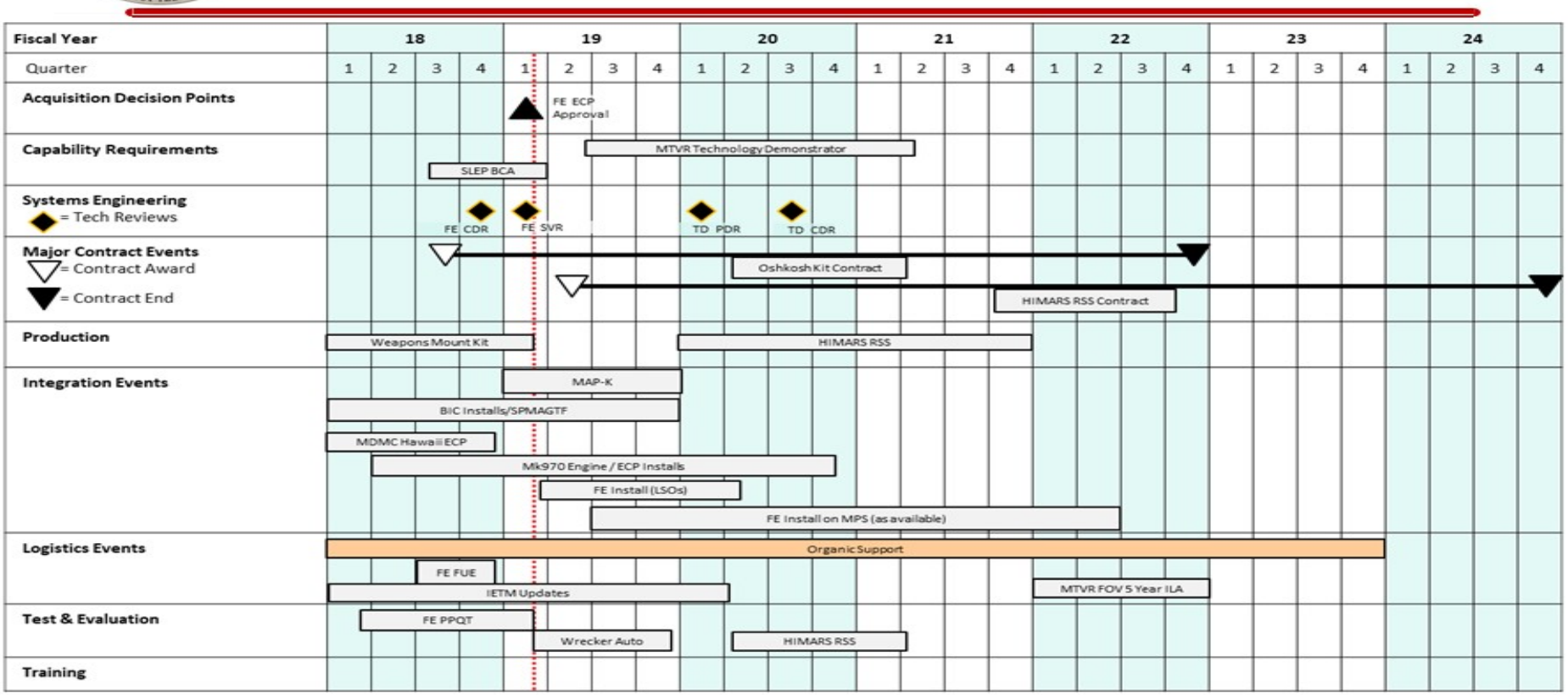

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2509 / *Motor Transport Mod*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MTVR				
Fuel Efficient Modifications (Install S/W)	1	2019	4	2019
ECP/Safety Mod Development	1	2019	4	2024
ECP/HIMARS Development	2	2019	2	2020
SLEP Tech Demonstrator	1	2019	1	2021
FE ECP Approval	1	2019	1	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 2510 / *MAGTF CSSE & SE*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2510: *MAGTF CSSE & SE*	31.863	3.225	6.015	3.036	-	3.036	4.539	4.445	4.176	4.259	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Environmental Control Equipment, Mobile Power Equipment and Advanced Power Sources are a part of Expeditionary Energy Initiatives.

A. Mission Description and Budget Item Justification

Environmental Control Equipment:
The Family of Environmental Control Equipment (ECE) consists of Environmental Control Units (ECU), Field Refrigeration Systems (FRS), and Cooling and Refrigeration Expeditionary Tool Kits (CREK). These systems provide required heating, cooling, storage, and servicing for systems throughout the Marine Corps. Current efforts seek to replace all legacy ECE with systems of higher reliability and higher efficiency using Environmental Protection Agency (EPA) approved refrigerants, which offer more energy efficiency, enhanced mobility, are easier to repair, and quieter than their predecessors. With environmental control systems consuming 50-70% of tactical electric power in theater, these savings will be a significant contribution to reducing the USMC fuel demand, and lightening the Marine Air-Ground Task Force (MAGTF). The Warfighter benefit includes a decreased logistics footprint, less reliance on petroleum-derived fuels, increased local energy security, and reduced tanker losses (fewer on the road). The operational imperative to reduce fuel usage will consequently reduce refueling operations and exposing Marines to hazardous fuel convoy operations.
Efforts include research, development, and integration testing of:
(1) Small Field Refrigeration Systems (SFRS) replacement. This effort seeks to replace legacy SFRSs to comply with restricting EPA regulations while increasing efficiency, thus reducing overall power requirements/demands.
(2) Family of ECU replacement. This effort seeks to replace legacy ECUs to comply with restricting EPA regulations while increasing efficiency, thus reducing overall power requirements/demands.

Mobile Power Equipment:
The Family of Mobile Electric Power Equipment consists of command and control systems for power management and distribution (intelligent power management), tactical generators ranging from 2 to 100 kilowatts, power distribution systems, energy storage systems, load banks, floodlights, cabling, and electrician tool kits.
This equipment is to procure, field,manage and provide electricity on the battlefield. Systems may be mounted on prime movers, skids or trailers. Systems support maneuver, combat support, and combat service support units requiring tactical power to operate weapons systems, Command, Control, Communications, Computers and Intelligence (C4I) systems, medical and messing facilities,environmental control equipment, and water purification systems. With over 10,000 generators and using diesel engines in the Operating Forces, improving their fuel efficiency and reliability will be a significant contribution to reducing the USMC fuel demand, and lightening the MAGTF. The Warfighter benefit includes a decreased logistics footprint, less reliance on petroleum derived fuels, increased local energy security, and reduced tanker losses (fewer on the road). The operational imperative to reduce fuel usage will consequently reduce
refueling operations and exposing Marines to hazardous fuel convoy operations.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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Efforts encompass research, development, integration, and testing of the following item:
Intelligent Power Management Systems (IPMS) provide a robust, modular, and scalable solution to interconnect, control, store and distribute power from various sources. As a result,the power requirements will be met in a more efficient manner by matching power production to load demand, reducing spinning reserve, extending maintenance cycle times, and reducing fuel consumption. The IPMS will consist of a micro-gridding capability which will consist of the Advance Digital Control System, which is a product improvement for the
Advance Medium Mobile Power Source generators, an Intelligent Power Distribution (IPD) system, an Energy Storage Unit (ESU), a Metering and Monitoring capability, and it will eventually integrate renewables.

The Advanced Power Sources:
The Advanced Power Sources(APS) efforts will focus on achieving the Marine Corps goal of lightening the Marine Air Ground Task Force (MAGTF) through reduced logistical fuel resupply needs. The Mobile Electric Hybrid Power Source (MEHPS) Capability Development Document (CDD) addresses the USMC Expeditionary Water and Waste (E2W2) Initial Capabilities Document (ICD) and supports the MAGTF intent to: travel lighter and faster, use less fuel, depend less on the supply chain; and reduce energy production, storage, and distribution requirements. This CDD addresses the Operational Energy (OE) ICD identifying the power and energy criticalities to the Joint Force. The Mobile Electric Hybrid Power System (MEHPS) will focus on hybrid power systems using solar panels and battery storage capable of improved fuel efficiency and silent operations in the 0.5-5kW and 10-15kW power range. These systems will be smaller, lighter and more efficient systems that reduce the demand for fossil fuels, extending the Commander's operational reach. These efforts will transition into production of systems that integrate with the Tactical Quiet Generator (TQG), Advanced Medium Mobile Power Sources (AMMPS), and future generator sets. The Lithium Battery Storage and Maintenance (LBSM) effort in coordination with large format lithium-Ion batteries integrated with MEHPS will focus on developing a modular solution to store and maintain a variety of battery form factors and chemistries. This will provide an environmentally protected, deployable battery maintenance and storage shelter with the capability to maintain and condition deployable batteries that will significantly decrease O&M costs to the Fleet by extending the life of fielded batteries.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Environmental Control Equipment	0.642	0.497	0.504	0.000	0.504
Articles:	-	-	-	-	-
FY 2019 Plans: -Design and develop phase II prototypes for the Small Field Refrigeration System (SFRS) replacement to comply with restricting EPA regulations while increasing efficiency, thus reducing overall power requirements/demands.					
FY 2020 Base Plans: -Perform testing of phase II prototypes for the Small Field Refrigeration System replacement to comply with restricting EPA regulations while increasing efficiency, thus reducing overall power requirements/demands.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase of $0.007M from FY19 to FY20 is due to the SFRS prototypes that are in development during FY18-FY19. Systems will require testing during FY20.					
Title: Mobile Power Equipment Next Gen Power Distribution System	1.624	3.350	0.152	0.000	0.152
Articles:	-	-	-	-	-
FY 2019 Plans: - Request entrance into Milestone B (1st Qtr FY19) for the Intelligent Power Management System, Contract Award (2nd Qtr. FY19) for the Intelligent Power Distribution (IPD) system, Developmental Testing for the IPD will start in the 4th Qtr. FY19					
FY 2020 Base Plans: - Development and Testing of Intelligent Power Distribution system prototypes to be used in support of Intelligent Power Management System (IPMS).					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease of $3.198M from FY19 to FY20 is due to the procurement of the Intelligent Power Distribution (IPD) system and is not required in FY20, whereas the funding for FY20 is to support development and testing of the Intelligent Power Distribution (IPD) system for the Intelligent Power Management System.					
Title: Advanced Power Sources	0.959	2.168	2.380	0.000	2.380
Articles:	-	-	-	-	-
FY 2019 Plans: MOBILE ELECTRIC HYBRID POWER SOURCES (MEHPS) -Complete MEHPS LUE -Solicit proposal and award for solar panel testing -Initiate Product Verification Testing (PVT) on solar panels -Conclude testing Medium system configuration of MEHPS -Solicit proposal for MEHPS					
FY 2020 Base Plans: FY 20 Base Plans MOBILE ELECTRIC HYBRID POWER SOURCES (MEHPS)					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Complete solar panel and Light and medium system testing -Complete all user evaluations -Mile Stone C achieved -Award MEHPS contract -LBSM prototype solicitation -Initiate MEHPS low rate initial production ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY19 to FY20 by $0.212M is due to the solar power integration testing to support the MHEPS program.					
Accomplishments/Planned Programs Subtotals	3.225	6.015	3.036	0.000	3.036

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/6054: *Environmental Control Equipment*	1.405	0.496	0.495	-	0.495	0.496	3.368	3.431	3.500	0.000	99.174
• PMC/6366-1: *Mobile Power Equipment*	5.611	8.122	12.058	-	12.058	8.642	8.828	10.012	10.212	Continuing	Continuing
• PMC/6366-2: *Advanced Power Sources*	4.666	7.438	10.383	-	10.383	15.778	16.092	16.431	16.760	Continuing	Continuing

Remarks

D. Acquisition Strategy

Environmental Control Units:
Small Field Refrigeration System replacement: Development under existing Army's Small Business Innovation Research (SBIR) which will transition into sole source procurement. Government testing to validate performance. Low Rate Initial Production (LRIP), followed by LRIP evaluation, then Full Rate Production (FRP) to procure using PMC funds on annual Delivery Orders. SFRSs are organically supported by Marines.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

Family of Environmental Control Units replacement: Initial focus on development of more efficient 36,000 BTU/Hr and 60,000 BTU/Hr size model Environmental Control Units (ECUs), since they make up the greatest percentage of the inventory and are used extensively for shelter heating and cooling. Full and open competition. Three contractors to develop and deliver prototypes in two size models. Government testing to validate performance. Single contractor to produce both models using multi-year ID/IQ production contract. Low Rate Initial Production (LRIP), followed by LRIP testing, then Full Rate Production (FRP) to procure using PMC funds on annual Delivery Orders. ECUs are organically supported by Marines.

Mobile Power Sources: IPMS Strategy. Each capability of IPMS will follow its own acquisition strategy/approach and the Government will be the integrator. This is due to the differing maturity levels of the capabilities as well as the variety of vendors required to provide those capabilities. While this document is encompassing for the total program, provided below are the various strategies being used for the increments of IPMS. Microgrid Strategy. The acquisition strategy for obtaining the microgrid capability is to execute a product improvement to the existing AMMPS generator systems currently employed. The US Army is the lead agency for the joint AMMPS program. MCSC is purchasing the MADCS product improvement systems and developing Technical Manuals and packaging. Fielding of the MADCS is planned to occur at the end of Calendar Year 2018. IPD Strategy. The acquisition strategy for IPD is to conduct market research on industry's capacity to develop/produce IPDs. Massachusetts Institute of Technology-Lincoln Laboratories (MIT-LL) is on contract to assist the Government in developing a Performance Specification (PSPEC) and interface design criteria. This market research and PSPEC development has just been finalized. The next step is to release a Request for Proposal (RFP) to industry in July 2018, conduct source selection, award to one vendor, procure prototypes and execute an Engineering and Manufacturing Development (EMD) program phase. At the conclusion of successful EMD and testing at Aberdeen Test Center (ATC), optional production delivery orders will be placed against a Firm Fixed Price (FFP), Indefinite Delivery Indefinite Quantity (IDIQ) Contract Line Item Number. ESU Strategy. The acquisition strategy for ESU is to conduct market research, develop a SOW and PSPEC, and release an RFP to industry in 3rd Quarter Fiscal Year 2019. Source selection will be conducted for planned award to two vendors. EMD phase will be executed and at the conclusion of testing at ATC the program office will go back out to industry to re-compete for production, First Article Testing will be conducted, and optional delivery orders will be placed against a FFP, IDIQ contract. Metering and Monitoring (M/M) Strategy. The acquisition strategy for the M/M capability is to provide a Statement of Work (SOW) to US Army Communications-Electronics Research, Development and Engineering Center (CERDEC) under its program for Energy Informed Operations (EIO). EIO has developed a government owned working microgrid M/M capability. They are tailoring this existing capability to meet IPMS requirements by collaborating with MIT-LL to ensure the M/M dashboard is utilizing the correct communication protocols designed to collect and display near real time data on the health and status of a power grid on the battlefield. This capability will be tested during Developmental Testing 1 and 2.

Advanced Power Sources: The acquisition strategy is to focus on development of the Mobile Electric Hybrid Power System (MEHPS). This R&D effort will focus on achieving the Marine Corps goal of lightening the MAGTF through reduced logistical fuel resupply needs, extending the Commander's operational reach. The development will focus on making these systems smaller, lighter and more efficient. The MEHPS program will purchase 8 medium and 8 light systems from two vendors through competitively awarded EMD contracts. The MEHPS systems will undergo rigorous electrical, environmental, safety, and performance testing to ensure they are robust and meet user requirements. Information learned in the EMD phase will help define the performance specification that will be used to award a full and open production contract.

E. Performance Metrics

SFRS: Energy efficiency; size; weight; EPA-approved refrigerant; affordability; organically supportable.
ECU: Energy efficiency; size; weight; EPA-approved refrigerant; affordability; organically supportable.
MOBILE POWER: Energy efficiency; size; weight; affordability; organically supportable.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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MEHPS: 55% savings in fuel and 80% reduction in generator runtime versus a standard 10 Kilowatt (kW) Tactical Quiet Generator (TQG).
BMASS: Energy efficiency; size; weight; ability to charge specified batteries.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MPE Micro Grid Storage/ IPM	C/FFP	AFLCMC : HANSCOM AFB	1.570	1.624	Mar 2018	1.000	Nov 2018	0.152	Apr 2020	-		0.152	Continuing	Continuing	Continuing
MPE IPD EMD	C/FFP	TBD : TBD	0.000	0.000		1.000	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing
MPE IPD Prototype Testing	C/FFP	ATC : Aberdeen, MD	0.000	0.000		1.350	Sep 2019	0.000		-		0.000	Continuing	Continuing	Continuing
ECE SFRS Replacement	MIPR	NSRDEC : NATICK, MA	0.000	0.642	Jul 2018	0.383	Nov 2018	0.000		-		0.000	Continuing	Continuing	Continuing
APS MEHPS Testing	WR	NSWC : CARDEROCK, MD	1.982	0.000		0.100	Jan 2019	0.000		-		0.000	Continuing	Continuing	Continuing
APS MEHPS Solar Power	C/CPFF	UEC : CHARLESTON, SC	0.000	0.000		0.200	Nov 2018	0.100	Apr 2020	-		0.100	Continuing	Continuing	Continuing
Prior Years Cumulative Funding	Various	VAR : VAR	17.246	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	20.798	2.266		4.033		0.252		-		0.252	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	VAR : VAR	0.059	0.000		0.000		0.000		-		0.000	0.000	0.059	-
		Subtotal	0.059	0.000		0.000		0.000		-		0.000	0.000	0.059	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ECE SFRS Replacement Test & Evaluation	MIPR	ABERDEEN TEST CENTER : ABERDEEN MD	0.262	0.000		0.114	Feb 2019	0.504	Nov 2019	-		0.504	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
APS MEHPS Testing (DT)	MIPR	ABERDEEN TEST CENTER : ABERDEEN, MD	0.700	0.549	Jun 2018	1.233	Nov 2019	0.000		-		0.000	Continuing	Continuing	Continuing
APS MEHPS User Evaluation	MIPR	NSWC CARDEROCK : CARDEROCK MD	0.000	0.410	Feb 2018	0.635	Sep 2019	2.280	Jan 2020	-		2.280	Continuing	Continuing	Continuing
APS MEHPS Lithium Battery Testing	WR	NSWC : CARDERROCK, MD	0.000	0.000	Jan 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
APS MEHPS Solar Panel Testing	MIPR	ABERDEEN TEST CENTER : ABERDEEN MD	0.000	0.000	Jul 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prior Year Cumulative Funding	Various	Various : Various	7.619	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	8.581	0.959		1.982		2.784		-		2.784	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MPE PM support for development and test mgmt	C/FFP	MCSC : Quantico, VA	2.425	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	2.425	0.000		0.000		0.000		-		0.000	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	31.863	3.225		6.015		3.036		-		3.036	Continuing	Continuing	N/A

Remarks

Environmental Control Equipment, Mobile Power Equipment and Advanced Power Sources are part of Expeditionary Energy Initiatives.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

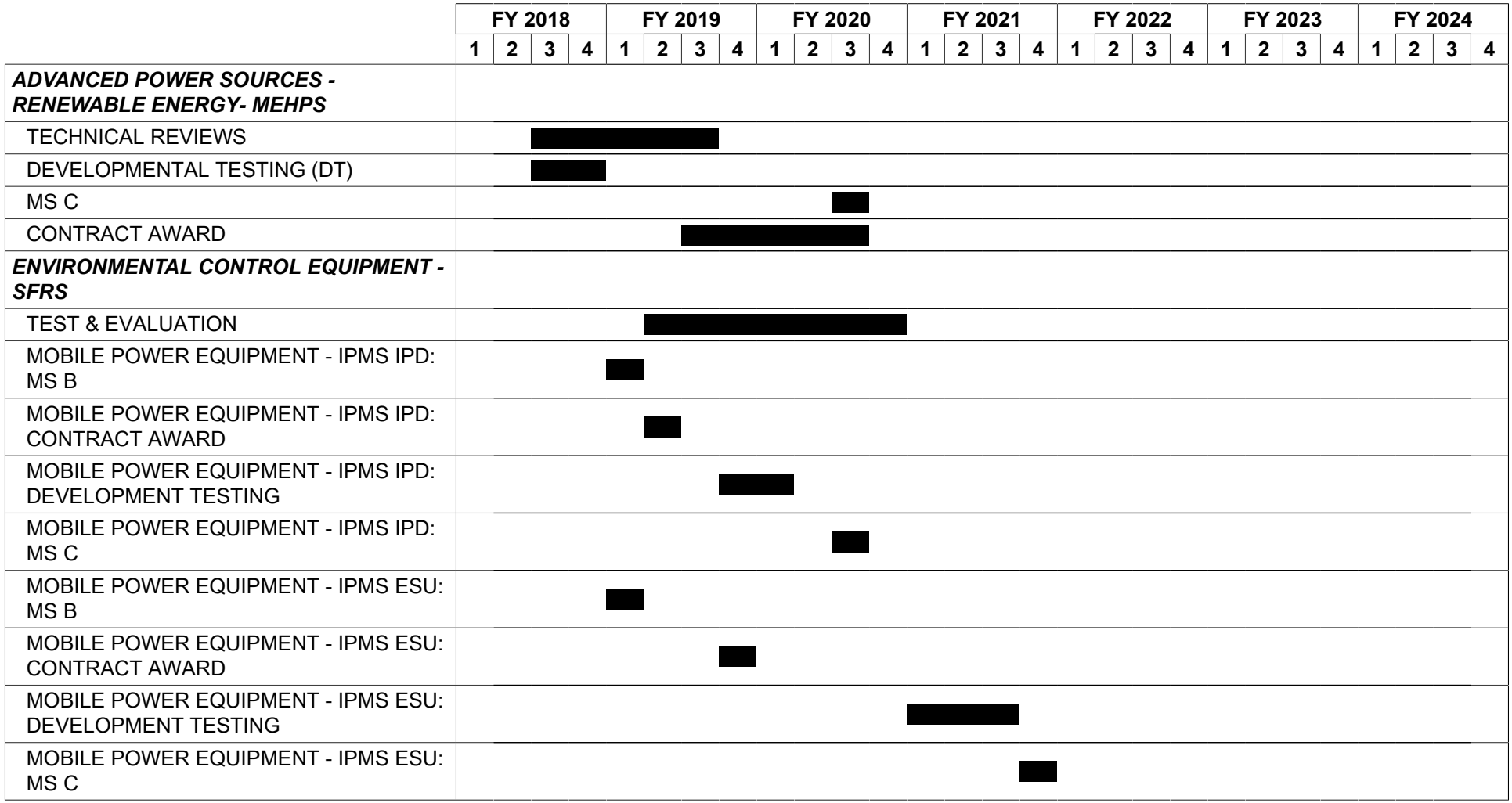

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2510 / *MAGTF CSSE & SE*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
ADVANCED POWER SOURCES -RENEWABLE ENERGY- MEHPS				
TECHNICAL REVIEWS	3	2018	3	2019
DEVELOPMENTAL TESTING (DT)	3	2018	4	2018
MS C	3	2020	3	2020
CONTRACT AWARD	3	2019	3	2020
ENVIRONMENTAL CONTROL EQUIPMENT - SFRS				
TEST & EVALUATION	2	2019	4	2020
MOBILE POWER EQUIPMENT - IPMS IPD: MS B	1	2019	1	2019
MOBILE POWER EQUIPMENT - IPMS IPD: CONTRACT AWARD	2	2019	2	2019
MOBILE POWER EQUIPMENT - IPMS IPD: DEVELOPMENT TESTING	4	2019	1	2020
MOBILE POWER EQUIPMENT - IPMS IPD: MS C	3	2020	3	2020
MOBILE POWER EQUIPMENT - IPMS ESU: MS B	1	2019	1	2019
MOBILE POWER EQUIPMENT - IPMS ESU: CONTRACT AWARD	4	2019	4	2019
MOBILE POWER EQUIPMENT - IPMS ESU: DEVELOPMENT TESTING	1	2021	3	2021
MOBILE POWER EQUIPMENT - IPMS ESU: MS C	4	2021	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2929: *Testing Measuring Diag Equip & SE*	10.197	0.588	0.647	0.572	-	0.572	0.626	0.638	0.652	0.664	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Marine Corps Family of Automatic Test Systems (ATS), provides automatic test program capability for use by technicians both in garrison and the forward edge of the battlefield; specifically in the areas of interactive electronic technical manuals, condition/predictive based maintenance, and embedded sensors and prognostics.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Automatic Test Systems (ATS)	0.588	0.647	0.572	0.000	0.572
Articles:	-	-	-	-	-
FY 2019 Plans: -Complete development of new advanced technology concepts for automatic test and integrate the radio frequency subsystems and components into fielded automatic test solutions to support weapon systems.					
FY 2020 Base Plans: -Initiate new and advanced stand-alone Electro-Optical capabilities for automatic testing in order to reduce test solution costs and logistics footprint and keep pace with the next generation of optic and laser equipment.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: -The $75K decrease from FY19 to FY20 reflects completion of the radio frequency subsystem prototype integration into a General Purpose Automatic Test Systems (GPATS) and its subsequent testing.					
Accomplishments/Planned Programs Subtotals	0.588	0.647	0.572	0.000	0.572

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4181: *Automatic Test Systems (ATS)*	25.163	9.958	9.046	-	9.046	4.979	5.075	5.283	5.389	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

Automatic Test Systems (ATS) acquisition is being done through U.S. Army Armament Research, Development & Engineering Center (ARDEC), Picatinny, NJ both in-house and contracts; In-house at Marine Corps Logistics Command (MCLC), Albany, GA; In-house at Naval Surface Warfare Center, Crane, and through Marine Corps Systems Command contracts.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATS Tech Eval & HW Digital Test	WR	MCLC Albany : Albany, GA	0.776	0.588	Feb 2018	0.647	Feb 2019	0.572	Feb 2020	-		0.572	Continuing	Continuing	Continuing
Prior Years Cumulative Funding	Various	N/A : N/A	5.443	0.000		0.000		0.000		-		0.000	0.000	5.443	-
		Subtotal	6.219	0.588		0.647		0.572		-		0.572	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	N/A : N/A	3.978	0.000		0.000		0.000		-		0.000	0.000	3.978	-
		Subtotal	3.978	0.000		0.000		0.000		-		0.000	0.000	3.978	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	10.197	0.588		0.647		0.572		-		0.572	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2929 / *Testing Measuring Diag Equip & SE*

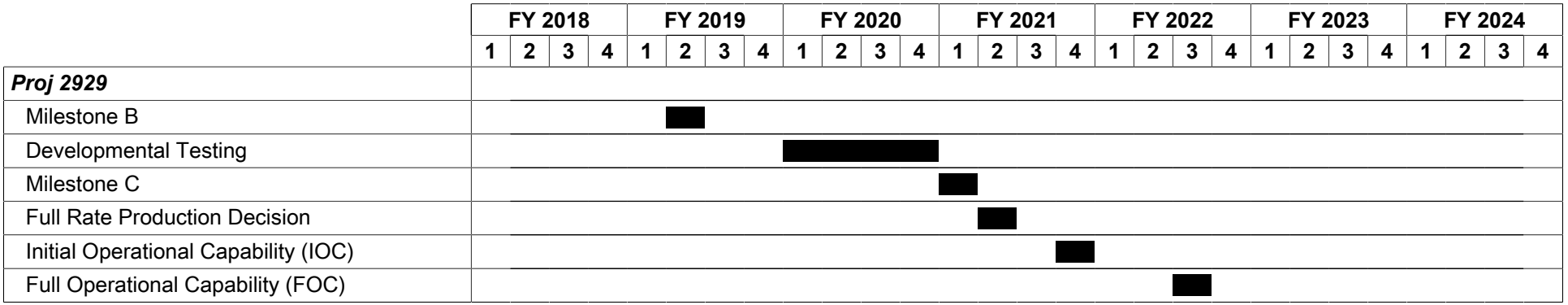

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 2929 / *Testing Measuring Diag Equip & SE*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2929				
Milestone B	2	2019	2	2019
Developmental Testing	1	2020	4	2020
Milestone C	1	2021	1	2021
Full Rate Production Decision	2	2021	2	2021
Initial Operational Capability (IOC)	4	2021	4	2021
Full Operational Capability (FOC)	3	2022	3	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 3776 / *Combat Track Vehicles Mod*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3776: *Combat Track Vehicles Mod*	0.000	0.000	14.601	25.222	-	25.222	5.215	4.861	4.062	4.143	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, funds supporting both M1A1 and IRV (M88A2) Modifications were realigned to project 3776, Combat Track Vehicles Mod. M1A1 previously resided in Project 2316, Combat Service Support Eng Equip. IRV (M88A2) Modifications funding previously resided in Project 2509, Motor Transport Mod. Realignment of efforts to new projects in FY19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

The Combat Track Vehicles Mod effort provides armor-protected mobile firepower to include improvements in all areas of the M1A1 main battle tank, Improved Recovery Vehicle (IRV), and Armored Vehicle Launched Bridge (AVLB). Efforts under the Mod line pertaining to the M1A1 include improvements such as: lethality systems, to increase armament accuracy and provide for off-board targeting improvements; survivability systems (including active and passive); communications and command and control; and mobility, increasing the crew's situational awareness through sensor enhancements and intra-vehicular data sharing; and environmental testing of components. The IRV (also known as the M88A2) provides heavy armor-protected recovery capability to the MAGTF. The Mod line funds research, development, and testing of improvements in all areas of the IRV. This funding addresses obsolescence and Engineering Change Proposals (ECPs) to improve performance and develop safety related ECPs to correct hazards noted during the day to day operation of the M88A2 IRV.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: M1A1 Modifications	0.000	14.242	24.855	0.000	24.855
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue supporting modifications to include the Firepower Enhancement Program (FEP)improvements, integration solutions and test items for Tactical Comm Modernization, components for the Ammunition Data Link (ADL) Increment II in order to support the ability to utilize next generation munitions to their full capability across the M1A1 fleet, and Non-Recurring Engineering (NRE) on the Active Protective System (APS) Technology Demonstrator to complete redesign and development of the system for operational suitability on the Tanks.					
FY 2020 Base Plans: - Initiate evaluation and integration of Survivability Layered Systems for signature management, crew situational awareness, and pre-shot capabilities (i.e., laser warning) along with the incorporation of Battle Management System (BMS) technology being developed by the U.S. Army.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 3776 / *Combat Track Vehicles Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiate operational testing and product improvement of the APS. - Continue to support modifications to include FEP, integration solutions and test items for Tactical Comm Modernization, components for the ADL II in order to support the ability to utilize next generation munitions to their full capability across the M1A1 fleet. Continue non-recurring engineering of the Active Protective System (APS) Technology Demonstrator to complete redesign and development of the system for operational suitability on the Tanks. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $10.613 increase in FY20 supports the evaluation and integration of active and passive Survivability Layered Systems (i.e. signature management, crew situational awareness, and pre-shot systems) with the ongoing Active Protection System effort started in FY17.					
Title: IRV (M88A2) Modifications	0.000	0.359	0.367	0.000	0.367
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue the development of modifications for the M88A2, such as Arctic Mobility and Exhaust redesign, in addition to supporting equipment to increase Reliability, Availability, and Maintainability, decrease operating costs, and address obsolescence, crew ergonomics, Command and Control improvements. ***FY 2020 Base Plans:*** - Purchase arctic mobility test articles to address the needed mobility improvements of the M88A2 in arctic conditions. - Continue the development of modifications for the M88A2 exhaust redesign, in addition to supporting equipment to increase Reliability, Availability, and Maintainability, decrease operating costs, and address obsolescence, crew ergonomics, Command and Control improvements. - Initiate the Automatic Fire Extinguishing System (AFES) fire alarm and sensor improvements ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 3776 / *Combat Track Vehicles Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
No significant increase from FY19 to FY20.					
Accomplishments/Planned Programs Subtotals	0.000	14.601	25.222	0.000	25.222

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/2061: *M1A1 Modification Kit*	19.778	22.904	22.760	-	22.760	37.635	45.271	56.646	57.782	0.000	980.108
• PMC/7000: *M1A1 Modification Kit*	0.362	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.079
• RDTE/0206624M/2316: *M1A1 Modification Kit*	14.228	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.562
• RDTEN/0206624M/2509: *M88A2 HERCULES Mod*	0.352	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.673

Remarks

D. Acquisition Strategy

(U) The M1A1 modification kits program will leverage Army initiatives to the maximum extent possible in order to incorporate modifications to adapt Army solutions to the USMC environment. The USMC will research, develop, and evaluate programs to improve the survivability, lethality, command and control, and mobility of the USMC tank. These efforts include ADL II, Advance Gunnery Target System (AGTS), Track Width Mine Plow (TWMP), Active Protection System (APS), and Tactical Comm Modernization. The USMC will refine the Active Protection System (APS) technology demonstrator's design in FY18 and FY19 in preparation for live fire testing and evaluation conducted along with the Army in FY20. Procurement of APS systems and supporting counter-measures is planned in FY21 to FY23. Survivability layered systems (active and passive) will focus on the integration and testing of new sub-systems as well as the incorporation of BMS technology being developed by the Army to be used with the APS system starting in FY20. Testing and integration of the Tactical Comm Modernization will occur FY18-19, with procurement commencing late FY19.

The IRV program leverages Army developmental projects to create a system that more readily meets Marine Corps Heavy Recovery Vehicle requirements. Improvements include modifications addressing safety that include artic mobility and exhaust redesign, reliability, and technology upgrades.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 3776 / *Combat Track Vehicles Mod*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M1A1 Mod - APS B-Kit	C/FFP	TACOM : Warren, MI	0.000	0.000		3.191	Jan 2019	0.457	Jan 2020	-		0.457	0.000	3.648	-
M1A1 Mod - APS A-Kit	C/CPFF	TACOM : Warren, MI	0.000	0.000		3.500	Jan 2019	2.521	Jan 2020	-		2.521	Continuing	Continuing	Continuing
M1A1 Mod - APS / IMOD	MIPR	TACOM : Warren, MI	0.000	0.000		3.100	Feb 2019	1.000	Mar 2020	-		1.000	Continuing	Continuing	Continuing
M1A1 Mod - APS Eng Spt	C/CPFF	TACOM : Warren, MI	0.000	0.000		1.100	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing
M1A1 Mod - Electro-Optinc Spt	MIPR	NVESD : Ft. Belvoir, VA	0.000	0.000		0.265	Nov 2018	0.270	Nov 2019	-		0.270	Continuing	Continuing	Continuing
M1A1 Mod - TCM	WR	SSC-LANT : Charleston, NC	0.000	0.000		0.125	Jul 2019	0.000		-		0.000	0.000	0.125	-
M1A1 Mod - AGTS	MIPR	PM TRASYS : Orlando, FL	0.000	0.000		0.361	Jul 2019	0.000		-		0.000	0.000	0.361	-
M1A1 Mod - ADL II	MIPR	ARDEC : Picatinny, NJ	0.000	0.000		0.250	Jul 2019	0.627	Dec 2019	-		0.627	0.000	0.877	-
M1A1 Mod - FEP STS	C/FFP	Raytheon : McKinney, TX	0.000	0.000		0.100	Jul 2019	0.690	Dec 2019	-		0.690	0.000	0.790	-
M1A1 Mod - TWMP	C/FFP	MCSC : Quantico, VA	0.000	0.000		0.050	Jul 2019	1.000	Feb 2020	-		1.000	0.000	1.050	-
M1A1 Mod - MAPS	MIPR	TACOM : Warren, MI	0.000	0.000		0.000		0.925	Mar 2020	-		0.925	0.000	0.925	-
M88A2 HERCULES	MIPR	TACOM : Warren, MI	0.000	0.000		0.359	Mar 2019	0.367	Mar 2020	-		0.367	0.000	0.726	-
		Subtotal	0.000	0.000		12.401		7.857		-		7.857	Continuing	Continuing	N/A

Remarks

M1A1 Mod - APS Test Spt consists of test ranges, logistic spt, ammo storage, instrumentation, personnel, reports, threat munition
M1A1 Mod - APS Eng Spt (GDLS) supports A-Kit refinement for application of the B-Kit to the M1A1
M1A1 Mod - MAPS (Modular Active Protection System) funds effort to integrate MAPS into the M1A1 tank configuration.
M1A1 Mod - BMS (Battle Management System) development of BMS integrates MAPS alerts and enables coordinated distribution to other tank battalion units
M1A1 Mod - Survivability Layered Systems includes integration and test of active and passive sub systems (signature management, crew situational awareness, and pre-shot systems).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 3776 / *Combat Track Vehicles Mod*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M1A1 Mod - Survivability Layered Systems	MIPR	TARDEC : Warren, MI	0.000	0.000		0.000		9.575	Mar 2020	-		9.575	0.000	9.575	-
M1A1 Mod - BMS	MIPR	TACOM : Warren, MI	0.000	0.000		0.000		5.390	Feb 2020	-		5.390	0.000	5.390	-
M1A1 Mod - APS Test Spt	MIPR	TACOM : Warren, MI	0.000	0.000		2.200	Jan 2019	2.400	Jan 2020	-		2.400	0.000	4.600	-
		Subtotal	0.000	0.000		2.200		17.365		-		17.365	0.000	19.565	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		14.601		25.222		-		25.222	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 3776 / *Combat Track Vehicles Mod*

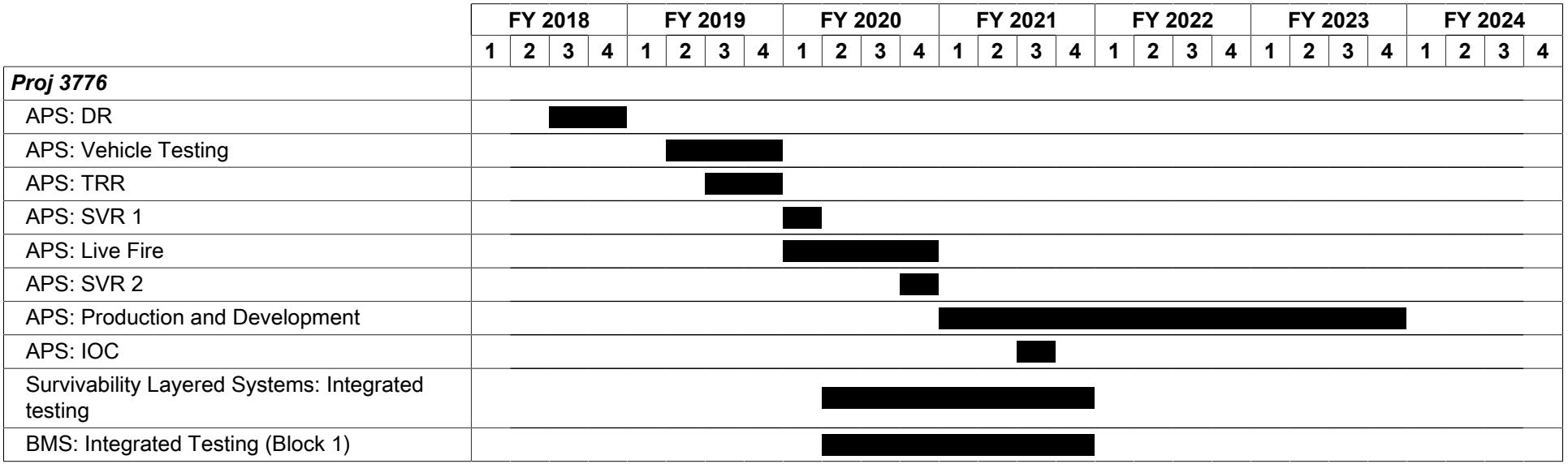

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 3776 / *Combat Track Vehicles Mod*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3776				
APS: DR	3	2018	4	2018
APS: Vehicle Testing	2	2019	4	2019
APS: TRR	3	2019	4	2019
APS: SVR 1	1	2020	1	2020
APS: Live Fire	1	2020	4	2020
APS: SVR 2	4	2020	4	2020
APS: Production and Development	1	2021	4	2023
APS: IOC	3	2021	3	2021
Survivability Layered Systems: Integrated testing	2	2020	4	2021
BMS: Integrated Testing (Block 1)	2	2020	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 9C90 / *MTVR Mod*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9C90: *MTVR Mod*	49.122	1.272	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	50.394
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

In FY19, MTVR funding has been realigned from project 9C90, MTVR Mod to project 2509, Motor Transport Mod. Realignment of efforts to new projects in FY 19 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

The Medium Tactical Vehicle Replacement (MTVR) Modification program line funds numerous modifications and initiatives required to address operational priorities, engineering change proposals, safety concerns, support equipment and other issues that affect vehicle reliability, availability, maintainability, readiness, as well as energy efficiency. A proactive and focused approach ensures proper vehicle sustainment and life-cycle management and it allows the program office to develop and implement improvements as required to respond to the evolving needs of the Marine Corps. For example, the Technology Demonstrator effort will continue to explore and develop strategies and products to extend the life of the MTVR to 2042 from its original date of 2024. The MTVR Technology Demonstrator provides the opportunity to integrate critical upgrades which could potentially be included into a Service Life Extension Program (SLEP). These upgrades would include improvements in fuel consumption, long-term maintainability and improved safety and crew survivability.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	0.105	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 decrease is due to the realignment from project 9C90, MTVR Mod to project 2509, Motor Transport Mod.					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: N/A					
Title: Support	0.197	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 9C90 / *MTVR Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: FY19 decrease is due to the realignment from project 9C90, MTVR Mod to project 2509, Motor Transport Mod. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** N/A					
Title: Test and Evaluation	0.970	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 decrease is due to the realignment from project 9C90, MTVR Mod to project 2509, Motor Transport Mod. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** N/A					
Accomplishments/Planned Programs Subtotals	1.272	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/5050: *MTVR Motor Transport Mods*	7.477	25.148	14.501	-	14.501	8.362	8.514	8.699	8.873	Continuing	Continuing
• RDTE/0206624M/2509: *MTVR*	0.000	3.672	3.949	-	3.949	0.106	0.105	0.117	0.120	Continuing	Continuing

Remarks

PMC BLI 5050 Motor Transport Modifications funds multiple programs/projects; only the funding associated with MTVR has been provided as Other APPN/LI 5050.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 9C90 / *MTVR Mod*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

RDTE 0206624M MTVR funding profile is realigned in this Program Element from Proj 9C90 to Proj 2509 for FY19 and future fiscal years.

D. Acquisition Strategy

The strategy for the MTVR Technology Demonstrator initiative is to aid in the prevention of parts obsolescence, address safety concerns, and respond to emergent threats. A proactive and focused approach ensures proper vehicle sustainment and life-cycle management and allows the program office the flexibility to develop and implement improvements as required to respond to evolving needs.

The strategy for the MTVR Fuel Efficiency (FE) initiative is to complete installation on the 4,300 armored MTVRs.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 9C90 / *MTVR Mod*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ECP Development	WR	NRL : Washington DC	0.148	0.105	Feb 2018	0.000		0.000		-		0.000	0.000	0.253	-
Prior Years Cumulative Funding	Various	Various : Various	23.205	0.000		0.000		0.000		-		0.000	0.000	23.205	-
		Subtotal	23.353	0.105		0.000		0.000		-		0.000	0.000	23.458	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Energy Initiative	WR	NSWC : Panama City, FL	1.008	0.197	Dec 2017	0.000		0.000		-		0.000	0.000	1.205	-
Prior Years Cumulative Funding	Various	Various : Various	11.157	0.000		0.000		0.000		-		0.000	0.000	11.157	-
		Subtotal	12.165	0.197		0.000		0.000		-		0.000	0.000	12.362	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Energy Initiative Testing	WR	Aberdeen Proving Ground : Aberdeen, MD	0.438	0.760	Jan 2018	0.000		0.000		-		0.000	0.000	1.198	-
Prior Years Cumulative Funding	Various	Various : Various	13.016	0.000		0.000		0.000		-		0.000	0.000	13.016	-
Energy Efficiency Initiative Development	C/FFP	Penn State University State College, PA : State College, PA	0.150	0.210	Jan 2018	0.000		0.000		-		0.000	0.000	0.360	-
		Subtotal	13.604	0.970		0.000		0.000		-		0.000	0.000	14.574	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206624M / *Marine Corps Cmbt Services Supt*	Project (Number/Name) 9C90 / *MTVR Mod*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	49.122	1.272		0.000		0.000		-		0.000	0.000	50.394	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 9C90 / *MTVR Mod*

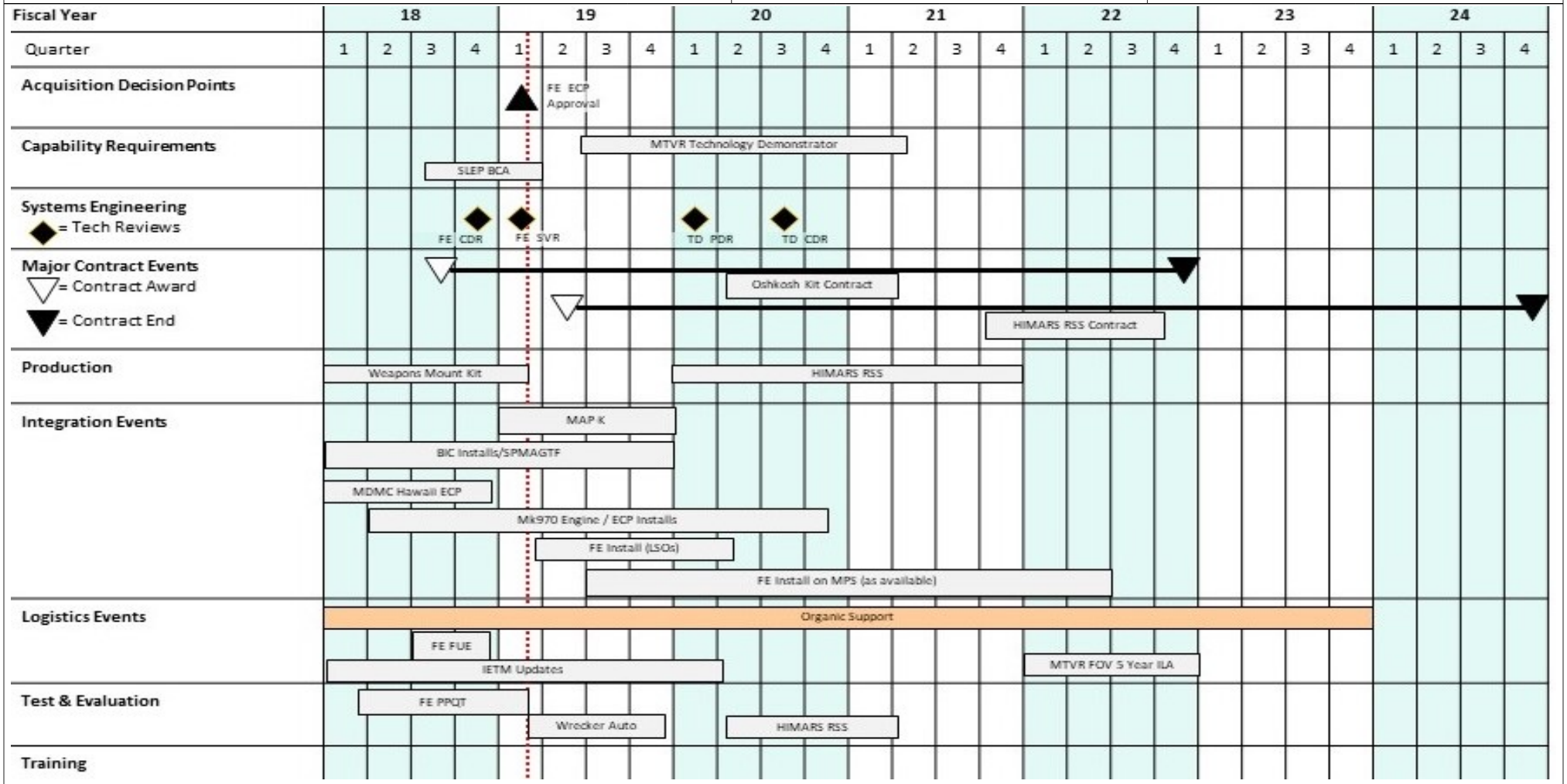

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206624M / *Marine Corps Cmbt Services Supt*	**Project (Number/Name)** 9C90 / *MTVR Mod*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9C90				
Fuel Efficient Modifications	3	2018	4	2019
Safety Mod Development	1	2018	4	2019
ECP Development	1	2018	4	2019
FE FUE	3	2018	4	2018

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0206625M *I USMC Intelligence/Electronics Warfare Sys*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	107.146	30.630	37.821	21.458	-	21.458	22.338	16.426	22.397	22.051	Continuing	Continuing
2272: *Intel Command and Control (C2) Sys*	107.146	30.630	31.346	14.974	-	14.974	15.744	9.695	15.528	15.045	Continuing	Continuing
3771: *Tactical Exploitation of National Capabilities (TENCAP)*	0.000	0.000	6.475	6.484	-	6.484	6.594	6.731	6.869	7.006	Continuing	Continuing

Note

Beginning in FY20, Intelligence Analysis System (IAS) and Technical Control Analysis Center (TCAC) resources have been realigned from PE 0206625M project 2272 to PE 0305208M project 2268, Distributed Common Ground/Surface Systems. Transition into the DCGS portfolio is necessary to concentrate investments in an integrated architecture thereby improving DCGS Enterprise alignment and more effectively leveraging the rapid integration of new technology.

A. Mission Description and Budget Item Justification

This Program Element (PE) for Intelligence Command and Control (C2) includes Military Intelligence Program (MIP) funds for Marine Corps Intelligence capabilities necessary to support the employment of intelligence, reconnaissance, surveillance (ISR), and target acquisition resources integral to delivering decision advantage at the speed of operational relevance outlined in the 2018 National Defense Strategy. Marine Corps intelligence capabilities are divided into three functional areas organized along intelligence processes: Sensing (Persistent ISR), Analysis
(Distributed Common Ground/Surface System Marine Corps (DCGS-MC)), and Dissemination (Intelligence Dissemination and Utilization (IDU)). This PE funds the Sensing and Dissemination portfolios while the Analysis portfolio is budgeted under DCGS-MC PE 0305208M.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	30.886	39.976	33.554	-	33.554
Current President's Budget	30.630	37.821	21.458	-	21.458
Total Adjustments	-0.256	-2.155	-12.096	-	-12.096
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.155			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.177	0.000			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-12.006	-	-12.006
• Rate/Misc Adjustments	0.000	0.000	-0.090	-	-0.090

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0206625M *I USMC Intelligence/Electronics Warfare Sys*

• Congressional General Reductions Adjustments	-0.079	-	-	-	-

Change Summary Explanation

The FY19 to FY20 funding decrease is due to transition of IAS and TCAC to the DCGS-MC PE 0305208M/Project 2268. Other contributing factors include: the completion of Tactical Signal Intelligence (SIGINT) Collection System (TSCS) Core Receivers, Modular Case, and MV-22 Aviation PIK product development; Communication Emitter Sensing and Attacking System (CESAS II) reduced hardware/software modifications and Spectrum Services Framework (SSF) development; Terrestrial Collection completion of MSIDS test and evaluation for Base Station and Outstation data controllers and completion of G-BOSS integration, system testing, and evaluation of advanced network components and sensor assets; Tactical Joint Worldwide Intel Comms Sys (JWICS) fielding beginning in FY20.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2272: *Intel Command and Control (C2) Sys*	107.146	30.630	31.346	14.974	-	14.974	15.744	9.695	15.528	15.045	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY20, Intelligence Analysis System (IAS) and Technical Control Analysis Center (TCAC) resources have been realigned from PE 0206625M project 2272 to PE 0305208M project 2268, Distributed Common Ground/Surface Systems. Transition into the DCGS portfolio is necessary to concentrate investments in an integrated architecture thereby improving DCGS Enterprise alignment and more effectively leveraging the rapid integration of new technology.

A. Mission Description and Budget Item Justification

INTELLIGENCE COMMAND AND CONTROL (C2) includes Military Intelligence Program (MIP) funds for Marine Corps Intelligence capabilities necessary to support the employment of intelligence, reconnaissance, surveillance (ISR), and target acquisition resources integral to delivering decision advantage at the speed of operational relevance outlined in the 2018 National Defense Strategy. Marine Corps intelligence capabilities are divided into three functional areas organized along intelligence processes: Sensing (Persistent ISR), Analysis (Distributed Common Ground/Surface System Marine Corps (DCGS-MC)), and Dissemination (Intelligence Dissemination and Utilization (IDU)). This project funds the Sensing and Dissemination portfolios while the Analysis portfolio is budgeted under the DCGS-MC PE.

PERSISTENT INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE (PISR) GROUND SYSTEMS: PISR is a comprehensive strategy that synchronizes organic and external ISR assets in support of MAGTF operations. This capability involves sensing the operational environment through a variety of systems, from satellites overhead to reconnaissance Marines on the ground. PISR incorporates terrestrial sensing capability from the following ground collection systems.

TERRESTRIAL COLLECTION provides a tactical ground sensor Family of Systems (FoS) that are organic to the MAGTF and facilitate near-real time PISR sensing to MAGTF decision-makers and users. Sensors are networked to the maximum extent possible to enable the sharing of standard data and information to support all six Marine Corps warfighting functions (C2,Intelligence, Operations, Protection, Fires, and Maneuver) with both targeting and battlespace awareness. An array of sensor delivery methods, and a variety of sensor characteristics enable the MAGTF to sense air (low altitude), land (surface, underground), sea (surface and subsurface), environmental effects (weather), and man-made objects (e.g. inside buildings) to determine threat location, disposition, movement and direction. The Terrestrial Collection portfolio includes, but not limited to, Ground Based Operational Surveillance System (GBOSS), MAGTF Secondary Imagery Dissemination System (MSIDS), and Tactical Remote Sensor System (TRSS). GBOSS is an expeditionary, ground-based, self-contained, multi-spectral sensor-oriented, persistent surveillance system used to observe, collect, detect, identify, classify, track, and report on contacts, objects of interest, and assessed threats twenty-four hours a day utilizing a fused video and sensor data display. MSIDS provides organic tactical digital imagery collection, transmission and receiving capability to the MAGTF Commander. TRSS provides all-weather direction, location determination, targeting, and tactical indications and warning of enemy activity in the MAGTF Commander's Area of Interest.

COUNTER INTELLIGENCE AND HUMAN INTELLIGENCE (CI/HUMINT) Equipment Program (CIHEP) provides each Marine CI/HUMINT Company within the Marine Corps Intelligence, Surveillance, and Reconnaissance Enterprise (MCISRE) with an integrated, standardized, and interoperable suite of information and communication

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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systems. The CIHEP program provides specialized equipment that is lightweight, modular, and tailorable, in deployable packages to conduct full spectrum, tactical CI and HUMINT activities, to include Technical Surveillance Countermeasures (TSCM) operations. TSCM operations use techniques to detect, neutralize, and exploit hostile technical surveillance technologies and hazards that permit the unauthorized access to or removal of information. CI/HUMINT elements are generally task-organized in support of a MAGTF or other supported commanders, providing them the capability to rapidly collect, process, and disseminate counterintelligence and human intelligence information in support of military planning and operations. CIHEP is comprised of ten modules of commercial and government off the-shelf equipment. Different components are selected for refresh each year in order to maintain current capabilities and ensure interoperability and standardization with related systems. This results in an equipment suite that enhances the operating force's CI/HUMINT capabilities, while maintaining interoperability within the USMC and joint CI/HUMINT communities. The modularity of the CIHEP program allows Marines to perform a variety of missions in support of commanders, while carrying only those items necessary to accomplish the mission. CIHEP provides state- of-the-art mission critical information protection capabilities, as well as the ability to detect, identify, and locate specific technical threats.

TACTICAL SIGNALS INTELLIGENCE (SIGINT) Collection System (TSCS) provides rapidly deployable capability that is the only Tactical Signals collection capability in the Marine Air-Ground Task Force (MAGTF) in both man packable and vehicular configurations, and provides collections capabilities needed to develop intelligence. The TSCS Family of Systems (FoS) incorporates the Radio Reconnaissance Equipment Program (RREP) and Team Portable Collection Systems - Multi-Platform Capable (TPCS-MPC) programs into a single program, providing a modular and scalable suite of equipment that exploits information from more technically advanced target sets. The TSCS FoS has an incremental acquisition strategy, providing Technical Refresh for legacy TPCS-MPC and RREP systems as the systems become obsolete and/or require technology insertions to maintain pace with our adversaries. The prioritization of capabilities included in each increment is based on obsolescence and required capability upgrades against advanced target sets. Fluctuations within the funding profile is due to different components being refreshed each year.

COMMUNICATION EMITTER SENSING and ATTACKING SYSTEM (CESAS) is the sole USMC high power, man-packable, and ground mobile Electronic Attack (EA) asset. CESAS supports the MAGTF Commander in the execution of his Electronic Warfare (EW) operations and Information Operations, by detecting, denying, and disrupting hostile communication emitters across a broad range of communication frequencies. CESAS covers the High Frequency (HF), Very High Frequency (VHF), and Ultra High Frequency (UHF) frequency ranges against enemy emitters using modern modulation schemes. CESAS allows flexible employment to conduct EA while on the move or in a stationary position, thus optimizing the Commander's ability to employ this asset for the greatest success of the mission. CESAS uses an incremental acquisition strategy, providing Technical Refresh for legacy systems as the systems become obsolete and/or require technology insertions to maintain pace with our adversaries.

PROCESSING, EXPLOITATION, ANALYSIS AND PRODUCTION SYSTEMS: Processing, exploitation, analysis and production actions of the Intelligence process enables Marines to understand the all-source information/data revealed by PISR. The Distributed Common Ground System - Marine Corps (DCGS-MC) Enterprise (BLI 4767) will serve as the Marine Corps ISR Enterprise (MCISRE) backbone, migrating select capabilities into a single, integrated, net-centric baseline via clearly defined capability drops. The Intelligence Analysis System (IAS) FoS (All-Source) and the Technical Control Analysis Center (TCAC) FoS (Signal Intelligence (SIGINT)) transition to Project 2268 DCGS-MC beginning FY20.

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INTELLIGENCE DISSEMINATION AND UTILIZATION (IDU) SYSTEMS: The IDU capability set performs the dissemination and integration functions of the Intelligence process. Dissemination connects the Intelligence product to the Commander who "operationalizes" these products through informed decisions.

The ITELLIGENCE BROADCAST RECEIVER(IBR) acquisition program is a family of terminals that conform to the Department of Defense (DoD) Integrated Broadcast Service (IBS) objectives of interoperability and commonality to receive and process near-real time multi-intelligence data. The IBR family of terminals provide MAGTF Commanders with the only direct access to IBS data via UHF Satellite Communications (SATCOM) broadcast channels. The IBR program is an evolving, multi-Service architecture designed to keep pace with Commanders' targeting and information requirements and conforms to the DoD IBS objectives of interoperability and commonality, which is currently accomplished using the Universal Serial Bus (USB) Embedded National Tactical Receiver (ENTR). The ENTR Version 4 (V4) will supplement and replace the USB ENTR which is no longer in production. The ENTR V4 provides a 50% weight reduction and doubles the life expectancy of the battery compared to the USB ENTR. Additionally, the IBR program is researching technology to meet the existing transceiver requirement identified in the Joint Tactical Terminal Joint Operational Requirements Document (JORD). The IBR family of terminals receive Blue Force Tracker data, which is a key element in developing and maintaining situational awareness as it relates to the common threat/common operating picture. The IBR provides NRT strategic, theater, and tactical sensor-to-shooter connectivity as well as NRT Theater Missile Defense indications and warnings. Additionally, the IBR provides connectivity to IBS Common Interactive Broadcast and IBS Alternative Path.

JOINT WORLDWIDE INTELLIGENCE COMMUNICATIONS SYSTEM (JWICS) is the Top Secret Sensitive Compartmented Information (TS/SCI) portion of the Defense Information System Network. It incorporates advanced networking technologies that permit point-to-point or multi-point information exchange involving voice, text, graphics, data and video teleconferencing within the DoD Intelligence Community. JWICS provides Marine Forces with special intelligence that significantly enhances the detail and quality of intelligence support that intelligence organizations provide to operating forces.

SENSITIVE COMPARTMENTED INFORMATION COMMUNICATIONS(SCI COMMS) is a Super-High Frequency multi-band satellite communications Family of Systems (FoS), that provides a tactical capability at the Top Secret (TS)/SCI and Secret Collateral levels to USMC intelligence units. The SCI COMMS FoS is the only deployable communications system that is dedicated for TS/SCI data and voice communications that can receive, transmit and disseminate bulk data and imagery products to and from national tactical intelligence sources. The FoS consists of palletized, team level, and man-packable systems - TROJAN SPIRIT, High Bandwidth Special Intelligence-Palletized Terminal (HBSI-PT), and Sensitive Compartmented Intelligence Kit (SCIK) - which provide USMC tactical commanders with high-capacity, near-real-time access to intelligence from national agencies, joint, coalition, service activities, intelligence producers, and other tactical units via connectivity to Joint Worldwide Intelligence Communications System, National Security Agency (NSA) Network, coalition networks, and Secret Internet Protocol Router Network.

The overall decrease of $16.372M is principally due to the realignment of TCAC and IAS resources to RDTE PRJ 2268, DCGS-MC, concentrating investments in an integrated architecture thereby improving DCGS Enterprise alignment and more effectively leveraging the rapid integration of new technology.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: *Intelligence Analysis System (IAS): Product Development	2.930	3.905	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: - Continue integration, system testing, and evaluation of Intelligence Servers into the IAS FoS. - Continue integration, system testing, and evaluation of advanced analytic technologies into the Intelligence Analysis System (IAS) Family of Systems (FoS). - Complete integration, system testing, and evaluation of DCGS Integrated Backbone into the IAS FoS. ***FY 2020 Base Plans:*** Refer to PE 0305208M Project: 2268; IAS will be funded in 2268 in FY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $3.905M decrease from FY19 to FY20 is the realignment of IAS resources under the DCGS-MC program element.					
Title: *Intelligence Analysis System (IAS): Support	0.966	0.567	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue program management support for integration of advanced analytics tools into the IAS FoS software baseline. - Continue program management support for integration and testing of Intelligence Servers into the IAS FoS. - Continue integration, system testing, and evaluation of DCGS Integrated Backbone into the IAS FoS. ***FY 2020 Base Plans:*** Refer to PE 0305208M Project: 2268; IAS will be funded in 2268 in FY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $0.567M decrease from FY19 to FY20 is the realignment of IAS resources under the DCGS-MC program element.					
Title: *Intelligence Analysis System (IAS): Test and Evaluation	0.961	1.700	0.000	0.000	0.000
Articles:	-	-	-	-	-

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: - Continue support for integration of advanced analytics tools into the IAS FoS software baseline. - Continue support for integration and testing of Intelligence Servers into the IAS FoS. - Continue integration, system testing, and evaluation of DCGS Integrated Backbone into the IAS FoS. - Initiate testing and evaluation for the Cross Domain Solution. ***FY 2020 Base Plans:*** Refer to PE 0305208M Project: 2268; IAS will be funded in 2268 in FY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $1.700M decrease from FY19 to FY20 is the realignment of IAS resources under the DCGS-MC program element.					
Title: *SCI COMMS: Product Development	0.370	0.539	0.459	0.000	0.459
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue efforts to procure new test assets, such as modems, and monitor and control devices to support security-based product improvements and ECPs. ***FY 2020 Base Plans:*** - Will continue efforts to develop new test assets, such as netflow network packages to support network obsolesence, and man-packable system test assets to support SWaP efforts, and security-based product improvements and ECPs. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.080K from FY 2019 to FY 2020 reflects completion of HBSI-PT test asset procurements.					
Title: *SCI COMMS: Support	0.000	0.106	0.113	0.000	0.113
Articles:	-	-	-	-	-
FY 2019 Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiate development of ECPs for end-of-life/end-of-sale equipment and modernization efforts for security-based products. ***FY 2020 Base Plans:*** - Continue development support of ECPs for end-of-life/end-of-sale equipment and modernization efforts for security-based products. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Title: *SCI COMMS: Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** - Initiate test and evaluation efforts which support engineering change proposals (ECPs) such as modems and monitor control devices. ***FY 2020 Base Plans:*** - Continue test and evaluation efforts which support engineering change proposals (ECPs) such as network package and man-packable test assets. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.087K from FY 2019 to FY 2020 supports man-packable testing.	0.000 -	0.061 -	0.148 -	0.000 -	0.148 -
Title: *Tactical Exploitation of National Capabilities (TENCAP): Product Development & Technical Assessments ***Articles:*** ***Description:*** Tactical Exploitation of National Capabilities (TENCAP): Decrease of $6.448M from FY18 to FY19 as program transitions to Project 3771. ***FY 2019 Plans:***	9.293 -	0.000 -	0.000 -	0.000 -	0.000 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Refer to Project: 3771; TENCAP will be funded in 3771 in FY19. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: *Tactical Signal Intelligence (SIGINT) Collection System (TSCS): Product Development ***Articles:***	1.299 -	5.045 -	5.520 -	0.000 -	5.520 -
FY 2019 Plans: - Complete hardware and software development of the TSCS Core Receivers (Increment I) and associated collection and Direction Finding (DF) antennas. - Initiate development of a Niche Antenna Kit. - Complete development of the TSCS Modular Case and MV-22 Aviation PIK (Increment 2). - Initiate required hardware/software modifications to TSCS/TPCS/RREP to enhance capability via ECPs. - Initiate development and integration of advanced digital payload/electronic warfare technology. ***FY 2020 Base Plans:*** - Complete development and integration of advanced digital payload/electronic warfare technology (Increment 2). - Complete development of a Niche Antenna Kit. - Initiate required hardware modifications to legacy TPCS LAV-EW and HMMWV PIKs to meet TSCS SWaP requirements. - Initiate development of the TSCS Body Worn System to replace legacy RREP system which are approaching obsolescence. - Initiate market research for the next generation TSCS workstation. - Continue development of required software capability to the TSCS baseline in order to counter emerging near peer asymmetric adversary threats. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The $0.532M increase from FY19 to FY20 reflects initiation of product development for the TSCS Body Worn System, Niche Antenna Kit, and TSCS Workstation.					
Title: *Tactical Signal Intelligence (SIGINT) Collection System (TSCS): Support	0.035	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: No significant change from FY19 to FY20					
Title: *Tactical Signal Intelligence (SIGINT) Collection System (TSCS): Test and Evaluation	1.289	0.650	1.077	0.000	1.077
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue developmental testing, shock/vibe testing, and environmental testing of the core receivers. - Continue testing of the TSCS software baseline updates. - Procure test articles for advanced digital payload/electronic warfare technology and initiate testing. - Conduct air certification of the MV-22 Aviation PIK.					
FY 2020 Base Plans: - Complete developmental testing, shock/vibe testing, and environmental testing of the TSCS modular case. - Complete developmental testing, shock/vibe testing, and environmental testing of advanced digital payload/ electronic warfare technology. - Procure test articles for the body worn system and Niche Antennas. - Continue testing of the TSCS software baseline updates.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The $0.427M increase from FY19 to FY20 reflects procurement of different test articles which have different unit costs.					
Title: *Technical Control and Analysis Center (TCAC): Product Development	3.037	3.515	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: -Initiates product development for the RAWS hardware refresh in order to conduct testing and evaluation events. -Initiates product development on low size, weight, and power (SWAP) for CDS. Continues research in support of the next hardware refresh for TWS and TCAC-G. ***FY 2020 Base Plans:*** Refer to PE 0305208M Project: 2268; TCAC will be funded in 2268 in FY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $3.515M decrease from FY19 to FY20 is the realignment of TCAC resources under the DCGS-MC program element.					
Title: *Technical Control and Analysis Center (TCAC): Support	0.315	0.291	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: -Continues technical support of improvements to the TCAC software baseline based on the Secure the Enterprise/ Secure the Newtork initiatives required by the National Security Agency (NSA) for network connectivity. -Continues technical support for the next hardware refresh for each component of the FoS. ***FY 2020 Base Plans:*** Refer to PE 0305208M Project: 2268; TCAC will be funded in 2268 in FY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The $0.291M decrease from FY19 to FY20 is the realignment of TCAC resources under the DCGS-MC program element.					
Title: *Technical Control and Analysis Center (TCAC): Test and Evaluation	1.640	2.534	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: -Completes developmental testing events before a fielding decision for the TWS/TCAC-G. -Initiates testing for the RAWS low SWAP replacement. Continues test design in support of the next hardware refresh for CDS, TWS, and TCAC-G. ***FY 2020 Base Plans:*** Refer to PE 0305208M Project: 2268; TCAC will be funded in 2268 in FY20. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $2.534M decrease from FY19 to FY20 is the realignment of TCAC resources under the DCGS-MC program element.					
Title: *Joint Worldwide Intel Comms Sys (JWICS): Product Development	0.000	1.714	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: The SCI Enterprise Office (SEO) will conduct research, development, testing and evaluation (RDT&E) to engineer a deployable voice, video, data, and circuit realignment solution that will provide the warfighter JWCIS services in the tactical environment. The solution(s) developed will re-engineer the High Bandwidth Special Intelligence Palletized Terminal (HBSI-PT) communications path to reduce the latency for Marine Corps Joint Worldwide Intelligence Communication (JWICS) network, by development of a tactical Point of Presence (POP). The solution(s) will house enterprise services such as Active Directory (AD), Dynamic Host Control Protocol (DHCP), distributed files services					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
(DFS), data storage, and print services behind a tactical node. This effort will also research the potential use of cloud services for continuity of tactical operations support. The solution(s) will increase the warfighters ability to produce useful and timely intelligence in a reliable, efficient manner. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding decrease of $1.714 from FY19 to FY20 due to Tactical JWICS fielding beginning in FY20.					
Title: *Ground-Based Operational Surveillance System: Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** - Transitions to Terrestrial Collection ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	1.782 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: *MAGTF Secondary Imagery Dissemination System (MSIDS): Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** -Transitions to Terrestrial Collection ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	0.169 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: *Terrestrial Collection: Product Development ***Articles:*** ***FY 2019 Plans:***	0.000 -	1.088 -	1.071 -	0.000 -	1.071 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiated development of Imager IIA software and hardware in order to properly receive, parse, and display messages; program, and confirm operational status of end items within the TRSS systems of systems. - Initiated development of TRSS Sentinel software changes to properly receive, parse, and display messages from systems with improved radios as well as interface directly with these systems to program them. - Initiated development of TRSS laptop software and hardware in order to properly receive, parse, and display messages, program, and confirm operational status of end items within the TRSS systems of systems. - Continue integration of advanced network components and sensor assets into all three variants of G-BOSS as part of scheduled technical refresh. - Initiate Terrestrial Collection integration of artificial intelligence and machine learning components and sensor assets aligned with updated Marine Corps operating concept and support improved ability to detect classify and identify objects of interest in an autonomous manner resulting in less resources required to monitor the environment. ***FY 2020 Base Plans:*** - Continue development of Imager IIA software and hardware in order to properly receive, parse, and display messages; program, and confirm operational status of end items within the TRSS systems of systems. - Continue development of TRSS Sentinel software changes to properly receive, parse, and display messages from systems with improved radios as well as interface directly with these systems to program them. - Continue development of TRSS laptop software and hardware in order to properly receive, parse, and display messages, program, and confirm operational status of end items within the TRSS systems of systems. - Complete integration of advanced network components and sensor assets into all three variants of G-BOSS as part of scheduled technical refresh. - Continue Terrestrial Collection integration of artificial intelligence and machine learning components and sensor assets. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.					
Title: *Tactical Remote Sensor System (TRSS): Test and Evaluation	0.474	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Transitions to Terrestrial Collection ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: *Tactical Remote Sensor System (TRSS): Product Development ***Articles:*** ***FY 2019 Plans:*** - Transitions to Terrestrial Collection ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	1.118 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: *Terrestrial Collection: Support ***Articles:*** ***FY 2019 Plans:*** - Initiate technical support and technical engineering efforts related to developmental test,electromagnetic test range utilization, developmental test range utilization, functional verification testing, and physical movement of test assets to and from system integrator facilities to test ranges associated with tech refresh of advanced network components and sensor assets into all three variants of G-BOSS. ***FY 2020 Base Plans:*** - Complete technical support and technical engineering efforts related to developmental test,electromagnetic test range utilization, developmental test range utilization, functional verification testing, and physical movement of test assets to and from system integrator facilities to test ranges associated with tech refresh of advanced network components and sensor assets into all three variants of G-BOSS. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***	0.000 -	1.000 -	0.000 -	0.000 -	0.000 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The $1.000M decrease from FY19 to FY20 reflects completion of technical support and technical engineering efforts related to developmental test,electromagnetic test range utilization, developmental test range utilization, functional verification testing, and physical movement of test assets to and from system integrator facilities to test ranges associated with tech refresh of advanced network components and sensor assets into all three variants of G-BOSS.					
Title: *Terrestrial Collection: Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** - Continue MSIDS test and evaluation effort for Base Station and Outstation data controllers to improve data throughout for compatibility with a new organic tactical radio waveform. - Continue system testing and evaluation of advanced network components and sensor assets into all three variants of G-BOSS as part of scheduled technical refresh. - Initiate Terrestrial Collection test and evaluation of artificial intelligence and machine learning components and sensor assets aligned with updated Marine Corps operating concept and support improved ability to detect classify and identify objects of interest in an autonomous manner resulting in less resources required to monitor the environment. ***FY 2020 Base Plans:*** - Complete MSIDS test and evaluation effort for Base Station and Outstation data controllers to improve data throughout for compatibility with a new organic tactical radio waveform. - Complete system testing and evaluation of advanced network components and sensor assets into all three variants of G-BOSS as part of scheduled technical refresh. - Continue Terrestrial Collection test and evaluation of artificial intelligence and machine learning components and sensor assets. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The $1.401M decrease from FY19 to FY20 reflects completion of MSIDS test and evaluation for Base Station and Outstation data controllers and completion of G-BOSS system testing and evaluation of advanced network components and sensor assets into all three variants of G-BOSS.	0.000 -	1.401 -	0.000 -	0.000 -	0.000 -
Title: *Counterintel and Human Intel Equip (CIHEP): Test and Evaluation	0.682	0.332	0.338	0.000	0.338

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue to provide engineering, integration and technical support required for planned CIHEP modernization of the TSCM (Technical Surveillance Countermeasures) equipment and CIHEP Family of Systems (FOS). ***FY 2020 Base Plans:*** - Continue to provide engineering, integration and technical support required for planned CIHEP modernization of the TSCM (Technical Surveillance Countermeasures) equipment and CIHEP Family of Systems (FOS). Acquiring test artifacts to integrate modernized proof of concept equipment. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.					
Title: *Communication Emitter Sensing and Attacking System (CESAS): Product Development	3.776	6.383	5.193	0.000	5.193
Articles:	-	-	-	-	-
FY 2019 Plans: -Initiate development of Constructive Electromagnetic Operational Environment System (CEMOES) (formerly Electromagnetic Spectrum Operations Range (EMSOR)), Spectrum Services Framework (SSF), Joint Light Tactical Vehicle (JLTV) Platform Integration Kit (PIK) and transition to CESAS Next Generation advanced digital payload/electronic warfare technology. ***FY 2020 Base Plans:*** -Continue development of Constructive Electromagnetic Operational Environment System (CEMOES) (formerly Electromagnetic Spectrum Operations Range (EMSOR)), Spectrum Services Framework (SSF), Joint Light Tactical Vehicle (JLTV) Platform Integration Kit (PIK) and transition to CESAS Next Generation advanced digital payload/electronic warfare technology and hardware/software modifications via Engineering Change Proposals (ECPs). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The $1.190M decrease from FY19 to FY20 reflects reduced hardware/software modifications via Engineering Change Proposals (ECPs) to enhance capability to the Constructive Electromagnetic Operational Environment System (CEMOES) (formerly Electromagnetic Spectrum Operations Range (EMSOR)) and reduced research and development of the Spectrum Services Framework (SSF).					
Title: Communication Emitter Sensing and Attacking System (CESAS): Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** -Initiate development and delivery of System Engineering artifacts, system design, test plans and reports, and requirements analysis. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Communication Emitter Sensing and Attacking System (CESAS): $0.500M increase from FY19 to FY20 initiates development and delivery of System Engineering artifacts, system design, test plans and reports, and requirements analysis.	0.000 -	0.000 -	0.500 -	0.000 -	0.500 -
Title: *Communication Emitter Sensing and Attacking System (CESAS): Support ***Articles:*** ***FY 2019 Plans:*** Continue to provide program support for required hardware/software modifications to CESAS II/RREMPEAS/ CESAS Next Generation advanced digital payload/electronic warfare technology and hardware modifications to HMMWV PIK to enhance capability via Engineering Change Proposals (ECPs). ***FY 2020 Base Plans:*** Continue to provide program support for required hardware/software modifications to CESAS II/RREMPEAS/ CESAS Next Generation advanced digital payload/electronic warfare technology, Constructive Electromagnetic Operational Environment System (CEMOES) (formerly Electromagnetic Spectrum Operations Range (EMSOR),	0.025 -	0.039 -	0.075 -	0.000 -	0.075 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Spectrum Services Framework (SSF), and hardware modifications to Platform Integration Kits (PIKs) to enhance capability via Engineering Change Proposals (ECPs). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.					
Title: *Intelligence Broadcast Receiver (IBR): Product Development ***Articles:*** ***FY 2019 Plans:*** - Continue ENTR system integration and test support, Common Integrated Broadcast (CIB) upgrade and system optimization support, and CIB operational testing. - Continue support of the Networking-On-The-Move (NOTM) integration and Integrated Broadcast System (IBS) server producer capability. - Initiate research and development for transceivers identified in the Joint Tactical Terminal Joint Operational Requirements Document (JORD). ***FY 2020 Base Plans:*** - Continue ENTR system integration and test support, CIB upgrade and system optimization support, and CIB operational testing. - Continue support of the Networking-On-The-Move (NOTM) integration and Integrated Broadcast System (IBS) server producer capability. - Continue research and development for transceivers identified in the Joint Tactical Terminal Joint Operational Requirements Document (JORD). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.	0.469 -	0.476 -	0.480 -	0.000 -	0.480 -
Accomplishments/Planned Programs Subtotals	30.630	31.346	14.974	0.000	14.974

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/474703: *TCAC*	4.581	6.749	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/474761: *IAS*	13.544	9.570	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/700000: *IAS SPARES*	0.000	0.160	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/474709: *CIHEP*	3.525	6.066	12.974	-	12.974	6.009	6.245	6.322	6.448	Continuing	Continuing
• PMC/474702: *TSCS*	2.431	23.173	17.106	-	17.106	16.263	12.717	8.077	8.468	Continuing	Continuing
• PMC/474701: *CESAS*	6.744	5.556	5.187	-	5.187	10.217	11.149	14.021	14.301	Continuing	Continuing
• PMC/474700: *SCI COMMS*	6.402	7.325	5.114	-	5.114	8.634	0.250	5.375	5.375	Continuing	Continuing
• PMC/700003: *TRSS SPARES*	0.356	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/700005: *MSIDS SPARES*	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/474752: *IBR*	6.040	3.472	3.014	-	3.014	1.494	1.509	1.549	1.570	Continuing	Continuing
• PMC/474713: *TRSS*	2.638	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/474719: *MSIDS*	1.061	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/4747XX: *G-BOSS*	3.274	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• PMC/4747XY: *JWICS*	6.498	4.615	6.861	-	6.861	6.802	8.021	7.585	7.737	Continuing	Continuing
• PMC/4747TC: *TERRESTRIAL COLLECTION*	0.000	6.442	6.642	-	6.642	2.448	0.892	2.910	2.968	Continuing	Continuing
• PMC/700006: *TERRESTRIAL COLLECTION SPARES*	0.000	0.261	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

(U) SCI COMMS: SCI COMMS leverages SSC-LANT support for Engineering Change Proposal (ECP) support, and existing Army Communication-Electronic Command (CECOM) Small Business Innovation Research (SBIR) and Defense Logistics Agency (DLA) Special Operations Equipment (SOE) contracts for test asset procurements.

(U) CIHEP: CIHEP makes maximum use of COTS, GOTS and NDI with Firm Fixed Price Production.

(U) IBR: IBR software upgrades are developed at Naval laboratories and integrated into the system. IBR makes maximum use of COTS, GOTS and NDI with Firm Fixed Price Production.

(U) CESAS: CESAS II production will consist of COTS and NDI integration into an existing GOTS architecture. Production efforts will be conducted at Naval laboratories.

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(U) TSCS: software upgrades are developed at Naval laboratories and integrated into the system. TSCS makes maximum use of COTS, GOTS, and NDI with Firm Fixed Price Production.

(U) JWICS: JWICS makes maximum use of COTS, GOTS and NDI with Firm Fixed Price Production.

(U) Terrestrial Collection: Tech refresh for sustainability to ensure operational readiness of the G-BOSS assets, assumes required engineering and logistics refresh funded per additional capability initiative. Makes maximum use of COTS, GOTS and NDI with Firm Fixed Price Production.

E. Performance Metrics

N/A

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CESAS	WR	SPAWAR : CHARLESTON, SC	3.471	3.776	Dec 2017	4.383	Dec 2018	3.693	Dec 2019	-		3.693	Continuing	Continuing	Continuing
CESAS	WR	PT MUGU : PT MUGU, CA	0.000	0.000		2.000	Jan 2019	1.500	Jan 2020	-		1.500	0.000	3.500	-
IBR	Various	VARIOUS : VARIOUS	0.210	0.469	Dec 2017	0.476	Dec 2018	0.480	Dec 2019	-		0.480	Continuing	Continuing	Continuing
IAS	WR	SPAWAR : CHARLESTON, SC	2.926	0.988	Nov 2017	0.000		0.000		-		0.000	0.000	3.914	-
IAS	C/CPFF	SPAWAR A3 : CHARLESTON, SC	1.528	1.942	Feb 2018	3.905	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
SCI COMMS	C/FFP	CECOM : ABERDEEN, MD	0.090	0.016	Aug 2019	0.114	May 2019	0.000		-		0.000	Continuing	Continuing	Continuing
SCI COMMS	C/IDIQ	DLA-1 : PHILADELPHIA, PA	0.000	0.131	Mar 2018	0.081	Feb 2019	0.312	Mar 2020	-		0.312	0.000	0.524	-
SCI COMMS	C/IDIQ	DLA-2 : PHILADELPHIA, PA	0.000	0.147	May 2018	0.149	May 2019	0.147	May 2020	-		0.147	0.000	0.443	-
SCI COMMS	C/IDIQ	DLA-3 : PHILADELPHIA, PA	0.000	0.076	Jun 2018	0.195	Aug 2019	0.000		-		0.000	0.000	0.271	-
TENCAP	C/IDIQ	NSMA : BOLLING AFB	0.098	0.000		0.000		0.000		-		0.000	0.000	0.098	-
TENCAP	C/IDIQ	SPAWAR-2 : CHARLESTON, SC	0.092	0.000		0.000		0.000		-		0.000	0.000	0.092	-
TENCAP	C/CPFF	DTIC-1 : FT. BELVOIR	12.633	0.000		0.000		0.000		-		0.000	0.000	12.633	-
TENCAP	WR	SPAWAR : CHARLESTON, SC	1.990	0.450	Oct 2017	0.000		0.000		-		0.000	0.000	2.440	-
TENCAP	C/CPFF	DTIC-2 : FT. BELVOIR	2.641	8.843	Oct 2017	0.000		0.000		-		0.000	0.000	11.484	-
CIHEP	WR	SPAWAR3 : CHARLESTON, SC	0.300	0.000		0.000		0.000		-		0.000	0.000	0.300	-
TCAC	C/CPFF	SPAWAR2 : Charleston, SC	1.914	0.228	Jan 2018	0.800	Jan 2019	0.000		-		0.000	Continuing	Continuing	Continuing

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TCAC	WR	SPAWAR8 : San Diego, CA	11.121	2.809	Jan 2018	2.715	Jan 2019	0.000		-		0.000	Continuing	Continuing	Continuing
JWICS	C/CPFF	DTIC-2 : FT. BELVOIR	2.800	0.000		1.714	Sep 2019	0.000		-		0.000	Continuing	Continuing	Continuing
TRSS	WR	SPAWAR-A2 : CHARLESTON, SC	0.293	1.118	May 2018	0.000		0.000		-		0.000	0.000	1.411	-
Terrestrial Collection	WR	SPAWARTC : CHARLESTON, SC	0.000	0.000		1.088	Jan 2019	1.071	Nov 2019	-		1.071	Continuing	Continuing	Continuing
TSCS	WR	SPAWAR : CHARLESTON, SC	8.262	1.005	Mar 2018	4.695	Mar 2019	5.170	Mar 2020	-		5.170	Continuing	Continuing	Continuing
TSCS	C/IDIQ	NSMA : BOLLING AFB	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
TSCS	C/FFP	DTIC : FT BELVOIR, VA	0.000	0.294	Apr 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
TSCS	FFRDC	MITRE : STAFFORD, VA	0.000	0.000		0.350	Dec 2018	0.350	Dec 2019	-		0.350	0.000	0.700	-
Prior Years Cumulative Funding	Various	Various : Various	29.929	0.000		0.000		0.000		-		0.000	0.000	29.929	-
		Subtotal	80.298	22.292		22.665		12.723		-		12.723	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CESAS	Various	MCSC9 : QUANTICO, VA	0.798	0.025	Sep 2018	0.039	Sep 2019	0.000		-		0.000	Continuing	Continuing	Continuing
CESAS	MIPR	NSWC DAHLGREN : DAHLGREN, VA	0.000	0.000		0.000		0.075	Nov 2019	-		0.075	0.000	0.075	-
IAS	C/CPFF	DTIC : Fort Belvoir, VA	2.039	0.662	Apr 2018	0.000		0.000		-		0.000	0.000	2.701	-
IAS	C/FFP	CECOM : FT. BELVOIR, VA	0.891	0.304	Oct 2017	0.000		0.000		-		0.000	Continuing	Continuing	Continuing

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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IAS	C/CPFF	SPAWAR : Charleston, SC	0.000	0.000		0.567	Feb 2019	0.000		-		0.000	0.000	0.567	-
SCI COMMS	WR	SPAWAR : Charleston, SC	0.172	0.000		0.106	Mar 2019	0.113	Feb 2020	-		0.113	Continuing	Continuing	Continuing
TCAC	MIPR	DTIC : FT Belvoir, VA	1.967	0.300	Apr 2018	0.000		0.000		-		0.000	0.000	2.267	-
TCAC	WR	SPAWAR-P : San Diego, CA	3.568	0.000		0.276	Apr 2019	0.000		-		0.000	Continuing	Continuing	Continuing
TCAC	Various	MCSC26 : QUANTICO, VA	0.043	0.015	Sep 2018	0.015	Sep 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Terrestrial Collection	WR	NSWC CRANE : Crane, IN	0.000	0.000		1.000	Apr 2019	0.000		-		0.000	Continuing	Continuing	Continuing
TSCS	Various	MCSC20 : QUANTICO, VA	0.158	0.035	Aug 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prior Years Cumulative Funding	Various	Not Specified : Not Specified	2.687	0.000		0.000		0.000		-		0.000	0.000	2.687	-
		Subtotal	12.323	1.341		2.003		0.188		-		0.188	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CESAS	WR	SPAWAR : CHARLESTON, SC	0.000	0.000		0.000		0.500	Dec 2019	-		0.500	0.000	0.500	-
SCI COMMS	C/CPIF	MCSC : QUANTICO, VA	0.050	0.000		0.000		0.148	Mar 2020	-		0.148	Continuing	Continuing	Continuing
SCI COMMS	C/FFP	CECOM : ABERDEEN, MD	0.000	0.000		0.005	Feb 2019	0.000		-		0.000	0.000	0.005	-
SCI COMMS	C/IDIQ	DLA : PHILADELPHIA, PA	0.000	0.000		0.056	May 2019	0.000		-		0.000	0.000	0.056	-
IAS	C/FFP	DTIC : FT. BELVOIR, VA	0.299	0.500	Apr 2018	0.000		0.000		-		0.000	0.000	0.799	-

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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IAS	WR	SPAWAR : CHARLESTON, SC	0.000	0.461	Nov 2017	1.700	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
TCAC	C/CPFF	SPAWAR8 : CHARLESTON, SC	1.131	0.586	Feb 2018	0.971	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
TCAC	C/CPFF	SPAWAR9 : SAN DIEGO, CA	1.461	1.054	Jan 2018	1.563	Jan 2019	0.000		-		0.000	Continuing	Continuing	Continuing
CIHEP	WR	SPAWAR-A4 : CHARLESTON, SC	0.875	0.107	Nov 2017	0.332	Nov 2018	0.113	Nov 2019	-		0.113	Continuing	Continuing	Continuing
CIHEP	WR	NSWC-DNA : VIRGINIA BEACH, VA	0.000	0.575	Nov 2017	0.000	Nov 2018	0.225	Nov 2019	-		0.225	0.000	0.800	-
G-BOSS	WR	NSWC CRANE : CRANE, IN	0.000	1.782	Feb 2019	0.000		0.000		-		0.000	0.000	1.782	-
MSIDS	WR	SPAWAR : CHARLESTON, SC	0.000	0.169	Apr 2018	0.000		0.000		-		0.000	0.000	0.169	-
TRSS	WR	SPAWAR-A1 : CHARLESTON, SC	0.000	0.474	Feb 2019	0.000		0.000		-		0.000	0.000	0.474	-
Terrestrial Collection	WR	SPAWAR : CHARLESTON, SC	0.000	0.000		0.174	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Terrestrial Collection	C/CPFF	NSWC CRANETC : CRANE, IN	0.000	0.000		1.227	Aug 2019	0.000		-		0.000	Continuing	Continuing	Continuing
TSCS	WR	SPAWAR : CHARLESTON, SC	2.676	1.289	Dec 2017	0.650	Dec 2018	1.077	Dec 2019	-		1.077	Continuing	Continuing	Continuing
TSCS	C/IDIQ	NSMA : BOLLING AFB	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
TSCS	C/FFP	DTIC : FT BELVOIR, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Prior Years Cumulative Funding	Various	Various : Various	8.033	0.000		0.000		0.000		-		0.000	0.000	8.033	-
		Subtotal	14.525	6.997		6.678		2.063		-		2.063	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	Project (Number/Name) 2272 / *Intel Command and Control (C2) Sys*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	107.146	30.630		31.346		14.974		-		14.974	Continuing	Continuing	N/A

Remarks

Funding reduction from FY 19 to FY20 reflects the realignment of Intelligence Analysis System (IAS) and Technical Control Analysis Center (TCAC) resources PE 0206625M project 2272 to PE 0305208M project 2268, Distributed Common Ground/Surface Systems. Transition into the DCGS portfolio is necessary to concentrate investments in an integrated architecture thereby improving DCGS Enterprise alignment and more effectively leveraging the rapid integration of new technology.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

TCAC Program Schedule

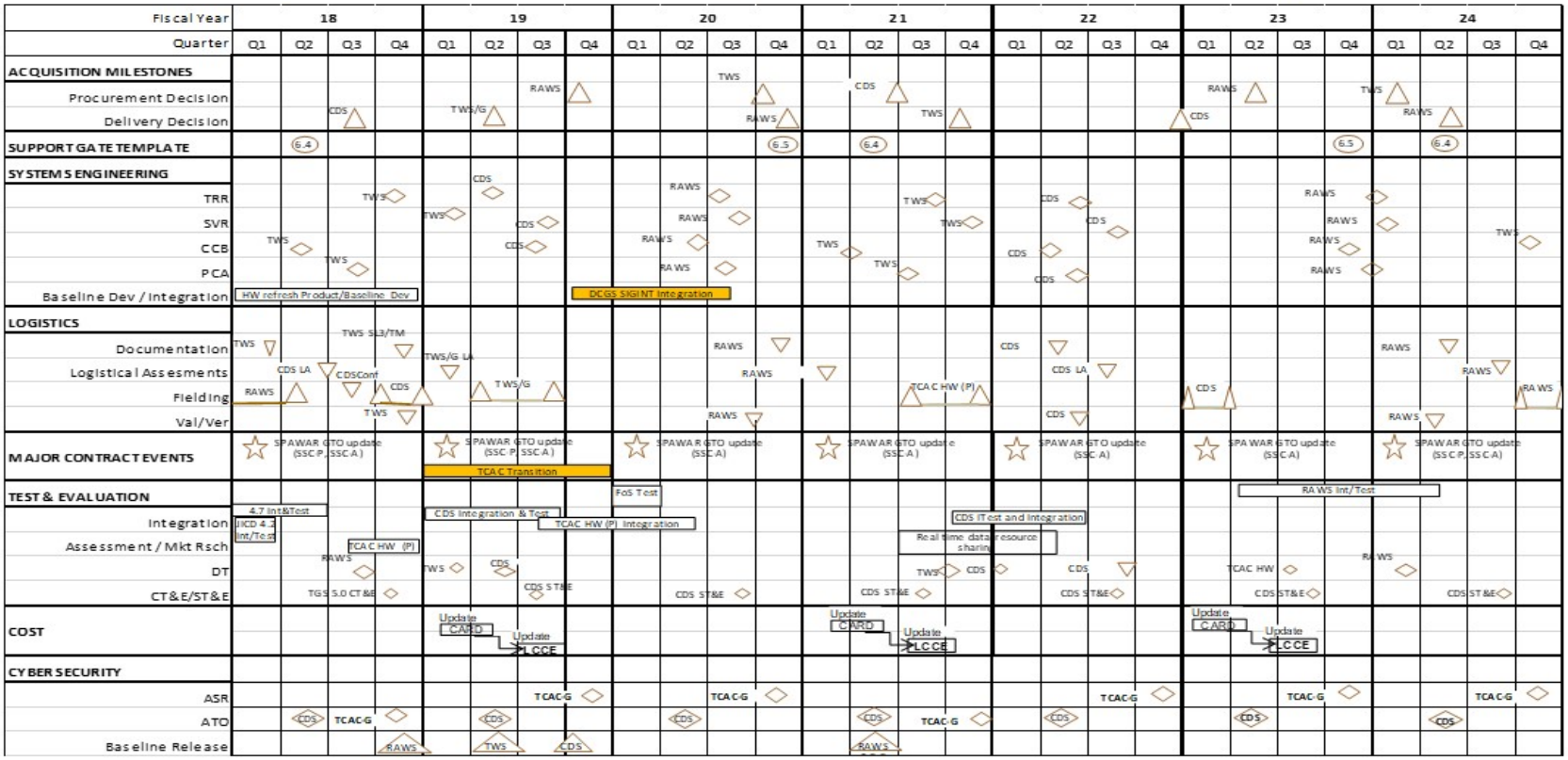


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

IAS FoS Program Schedule

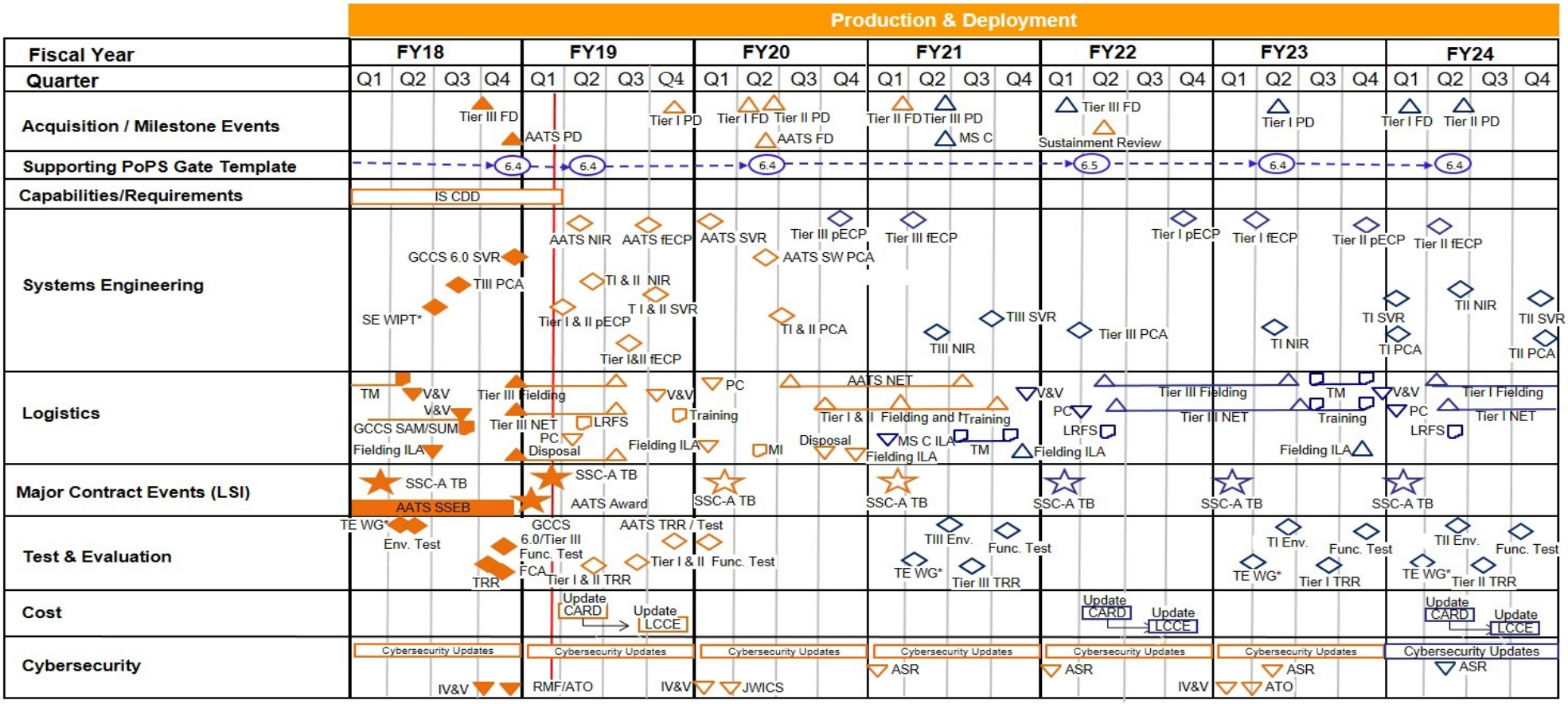
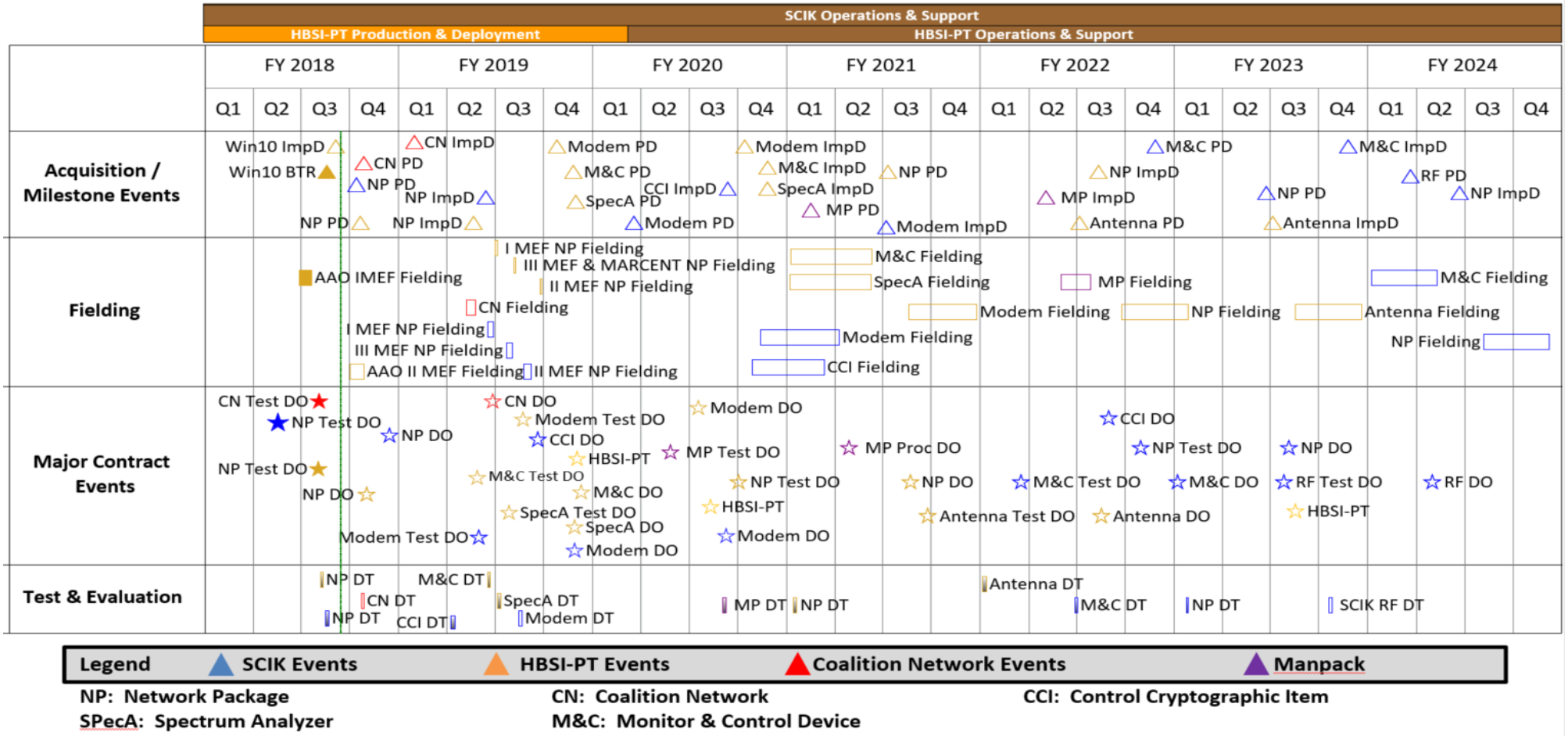


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

SCI Comms FoS Program Schedule



Legend SCIK Events | HBSI-PT Events | Coalition Network Events | Manpack

NP: Network Package
CN: Coalition Network
CCI: Control Cryptographic Item
SPecA: Spectrum Analyzer
M&C: Monitor & Control Device

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

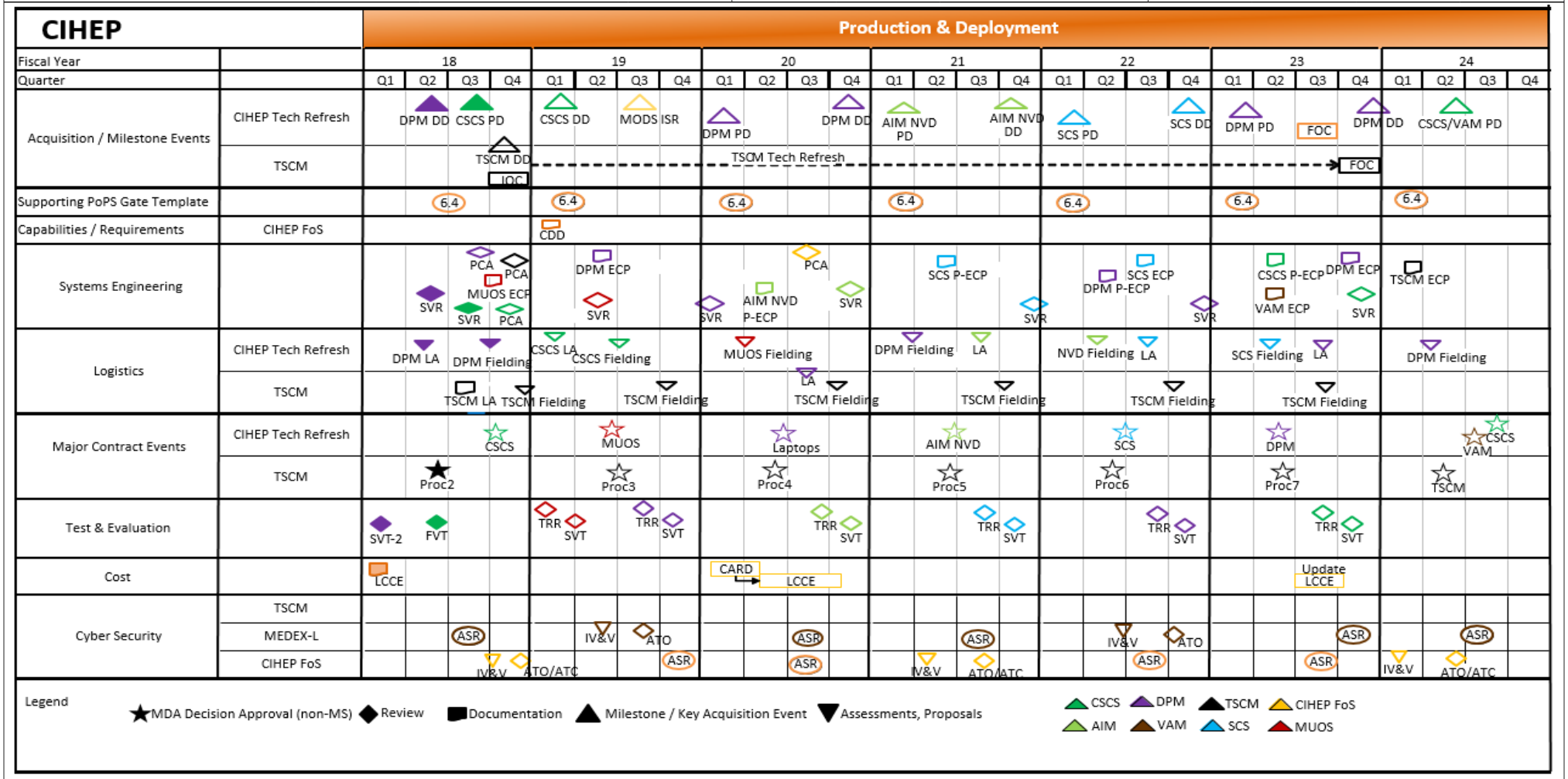


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

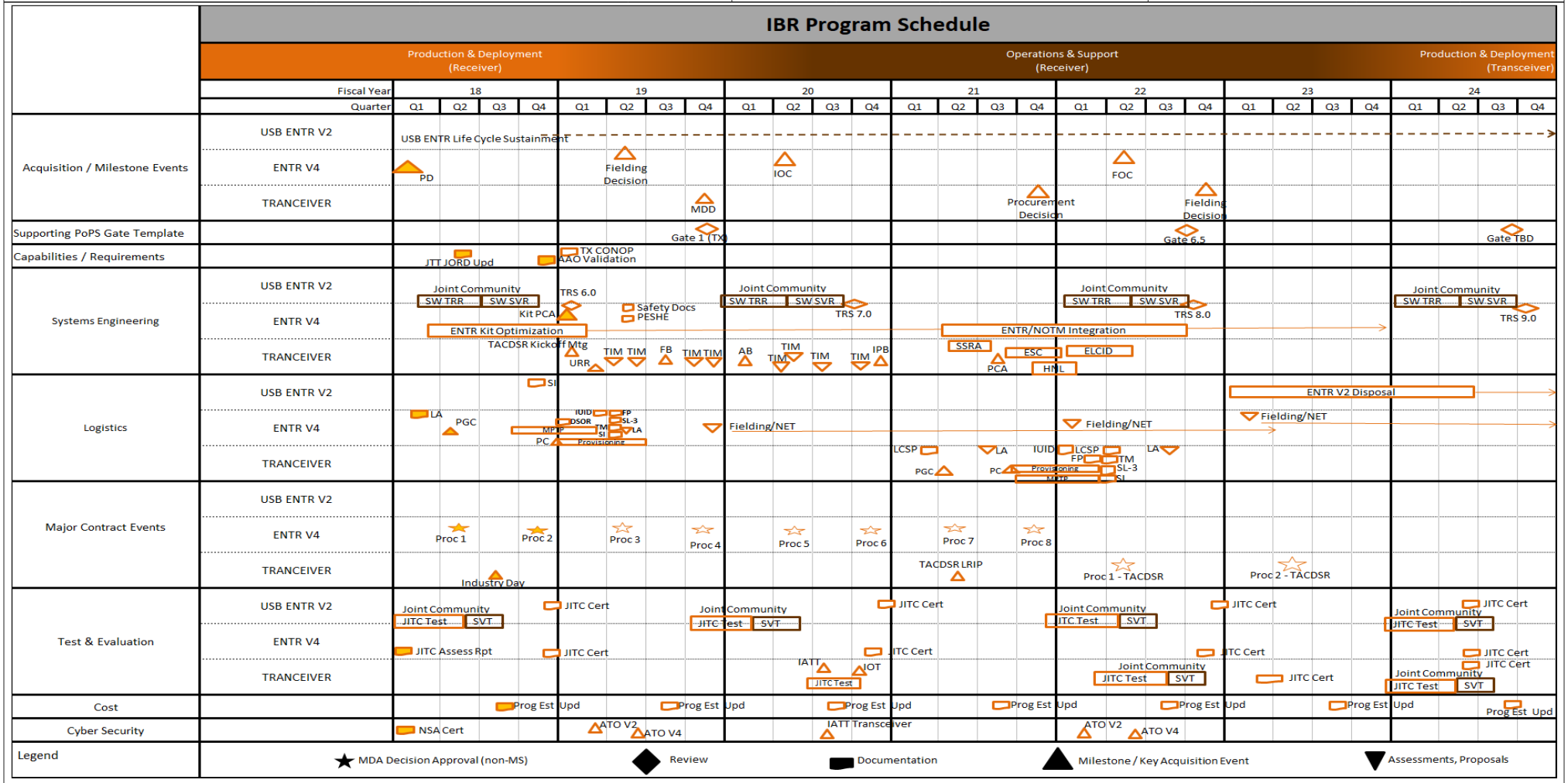


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

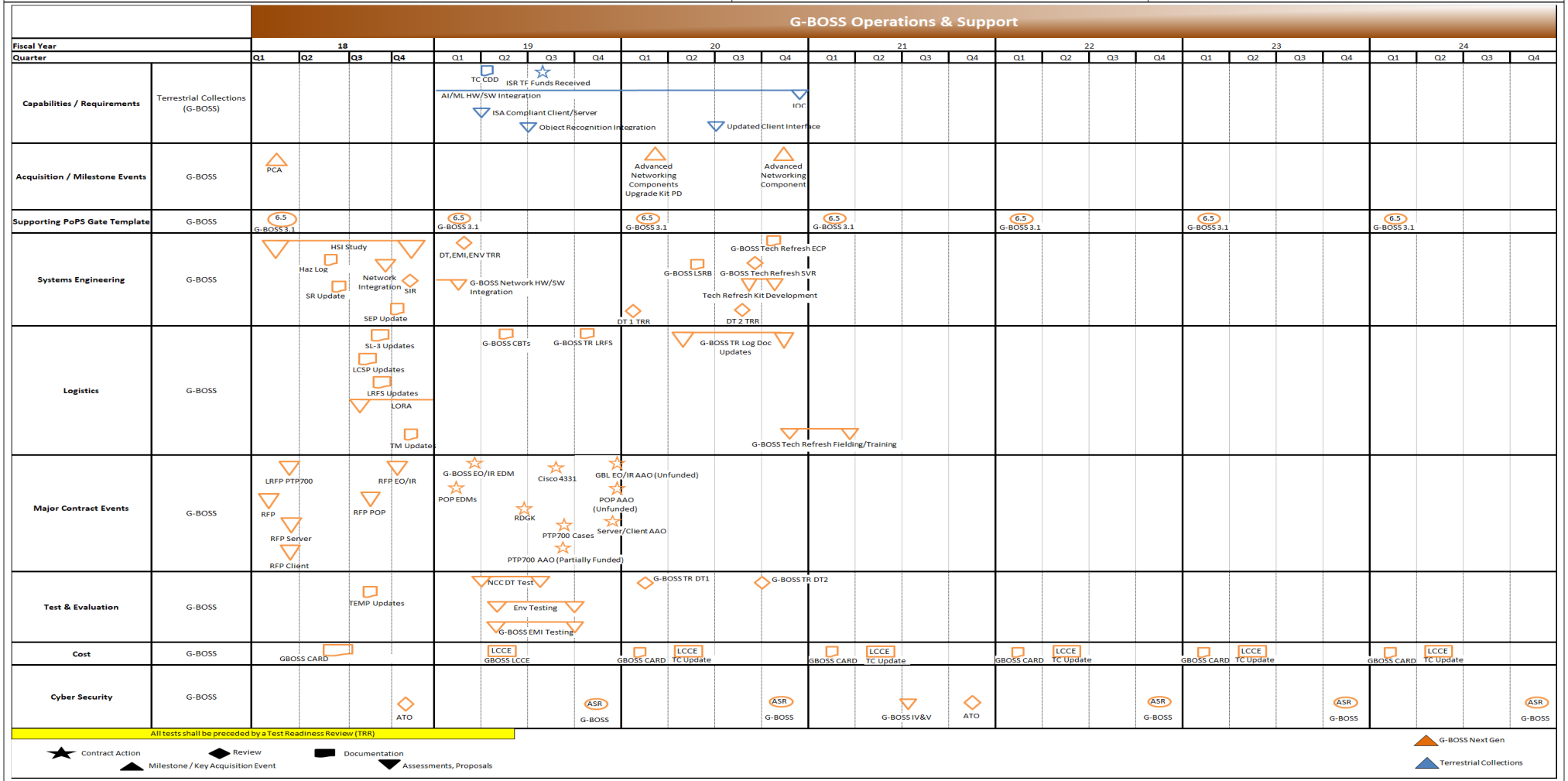


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

MSIDS Program Schedule

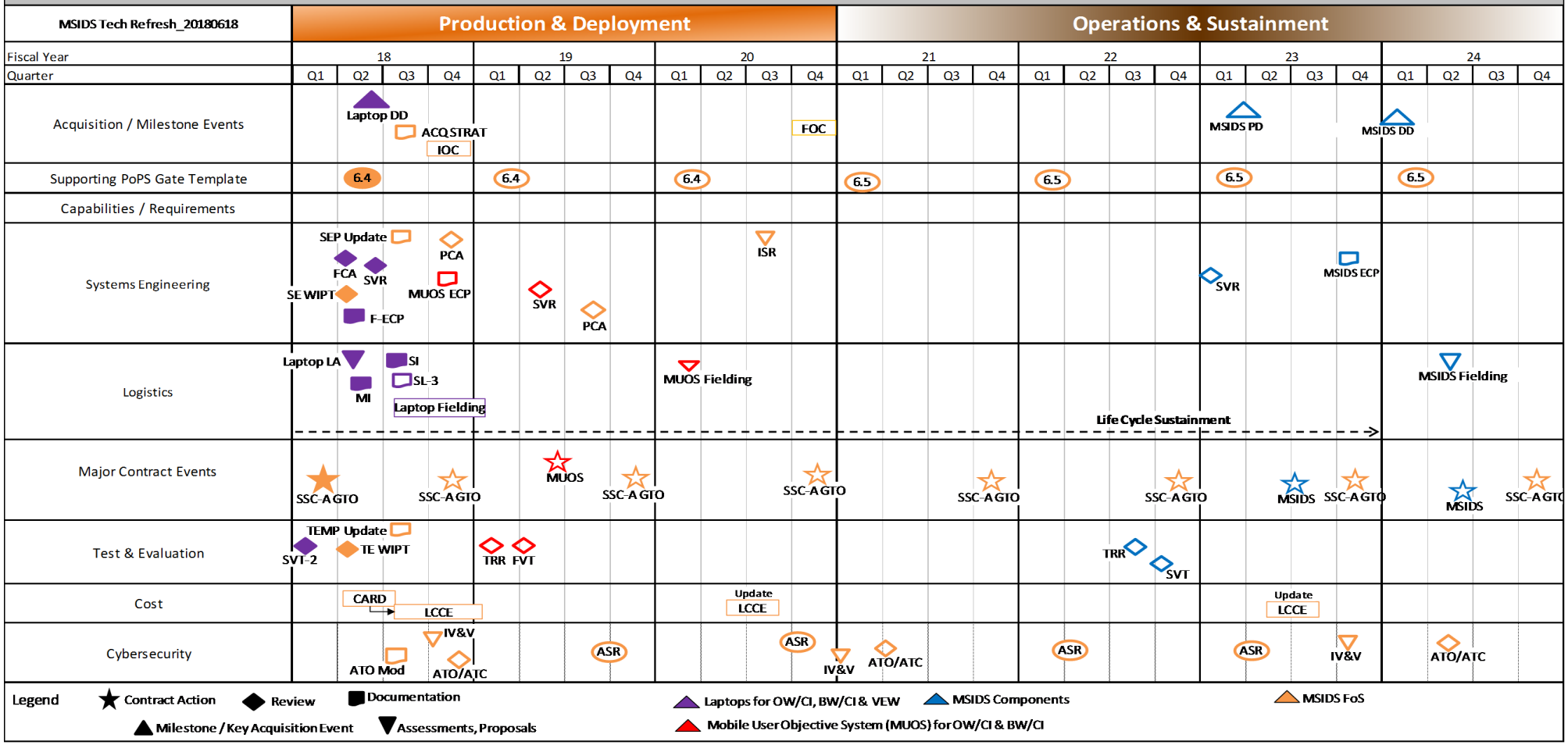


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

TRSS SoS Program Schedule

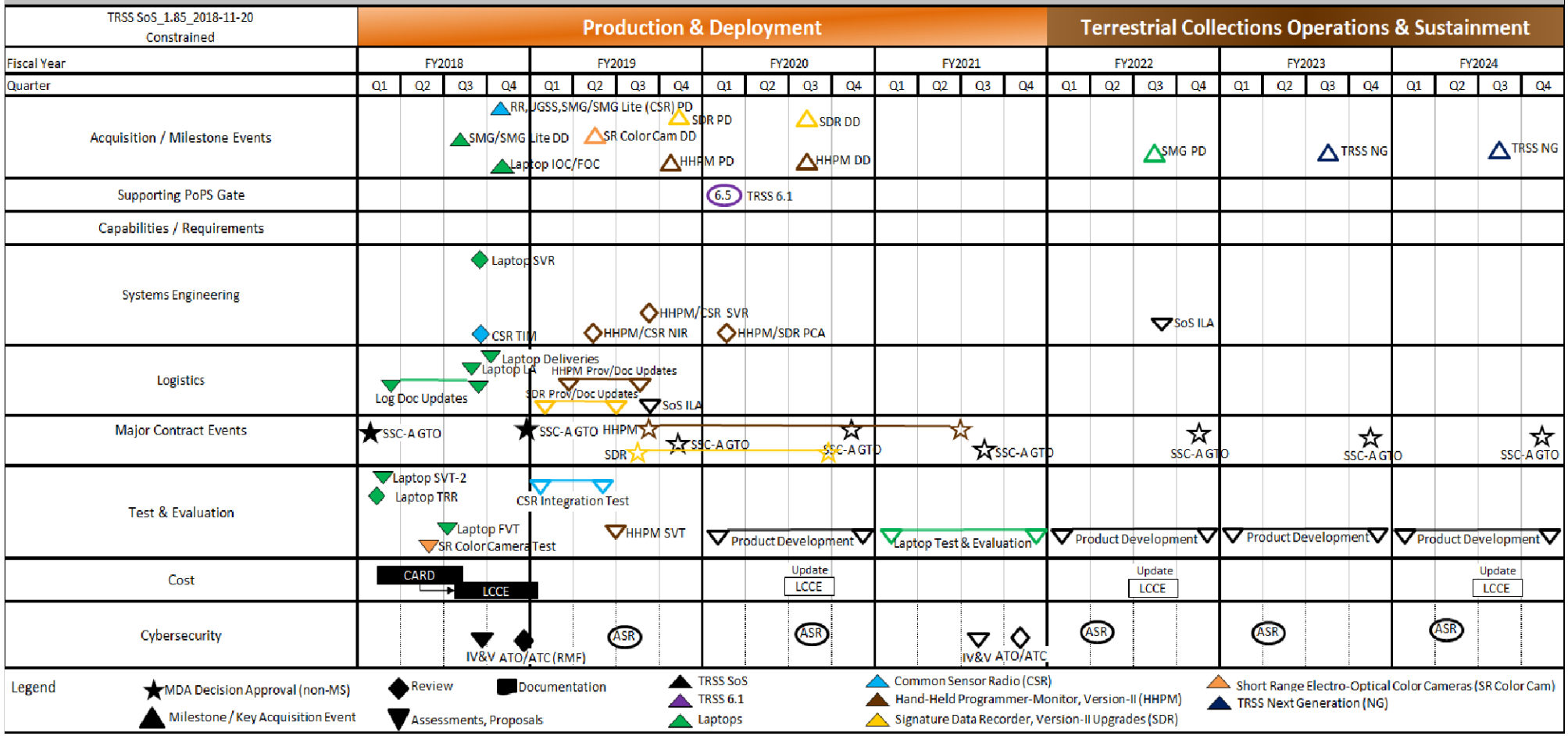


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

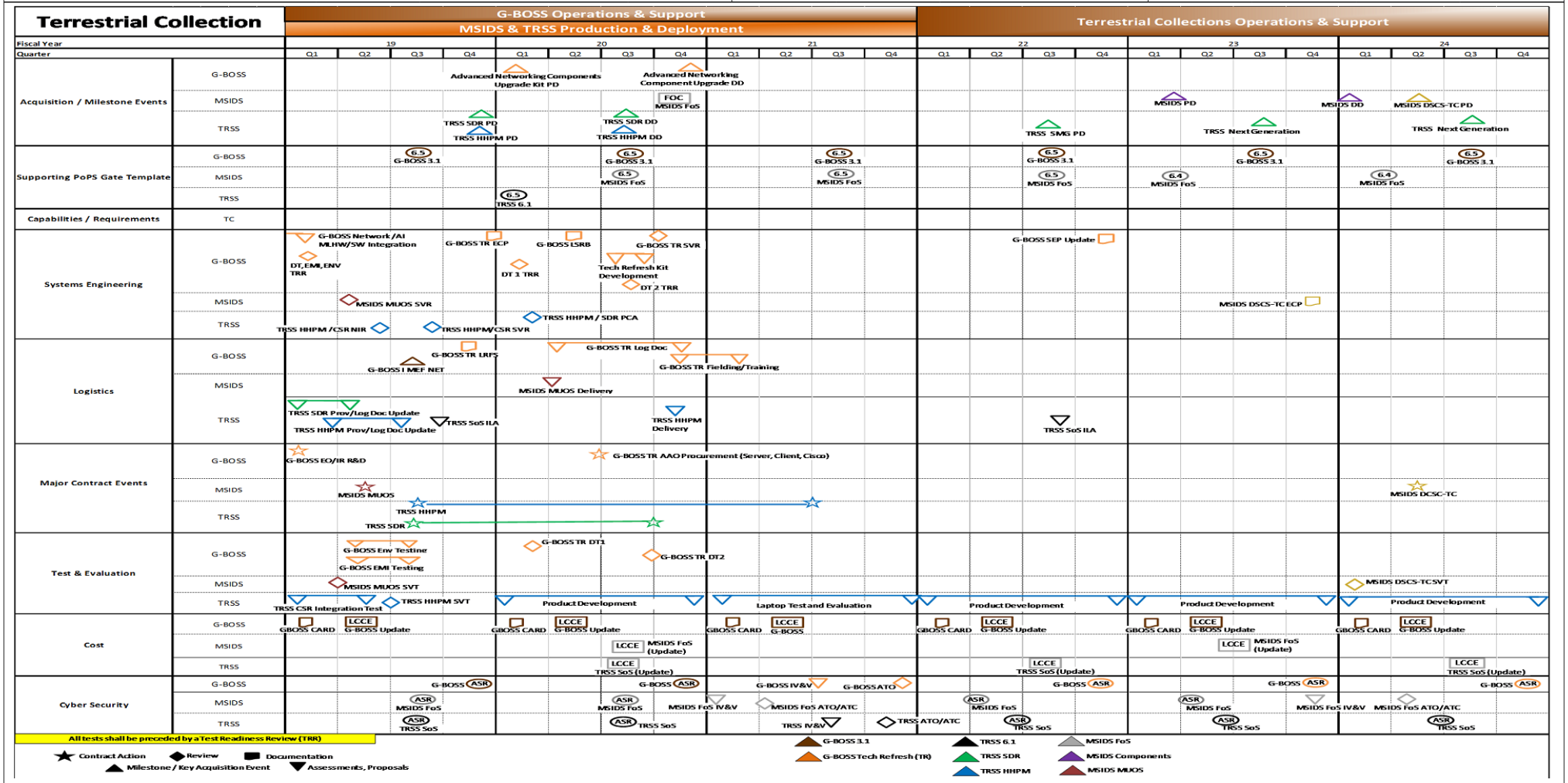


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

CESAS Program Schedule

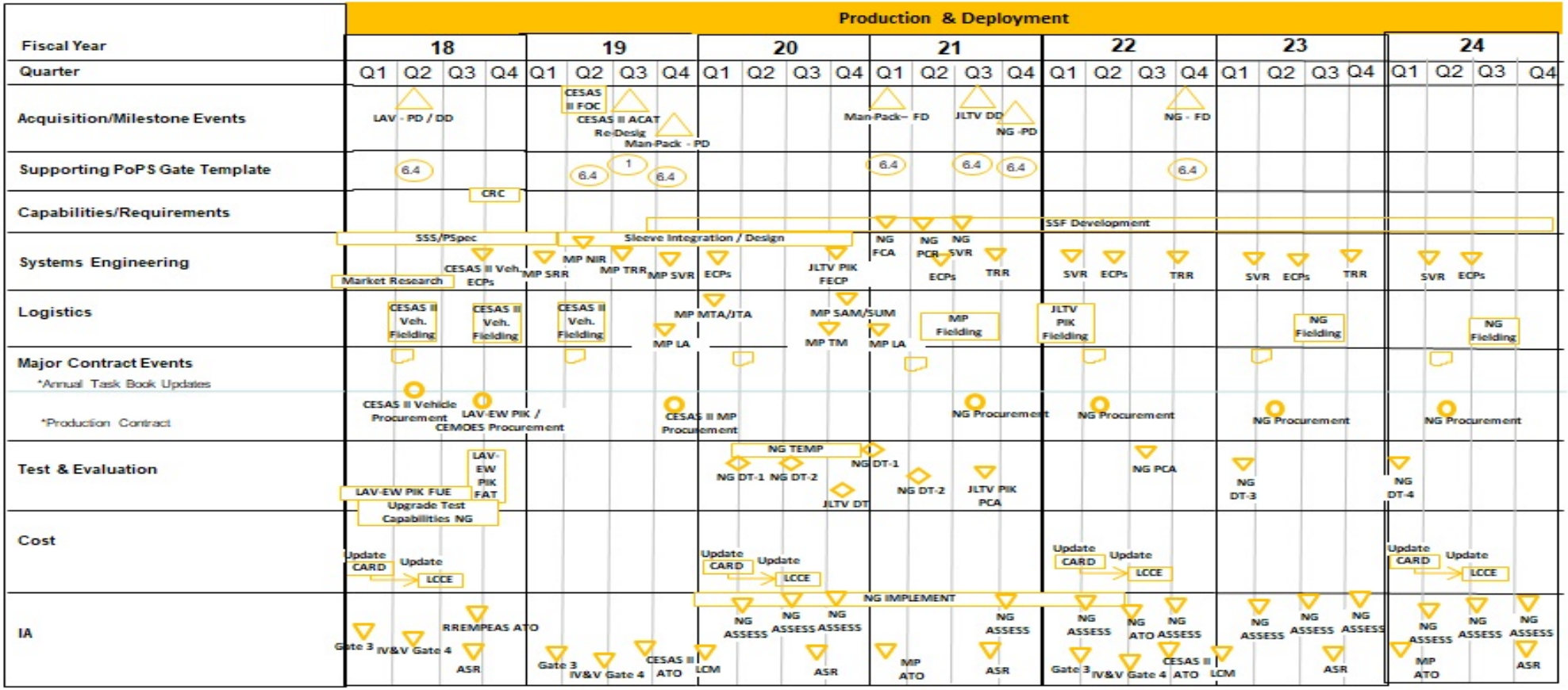


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

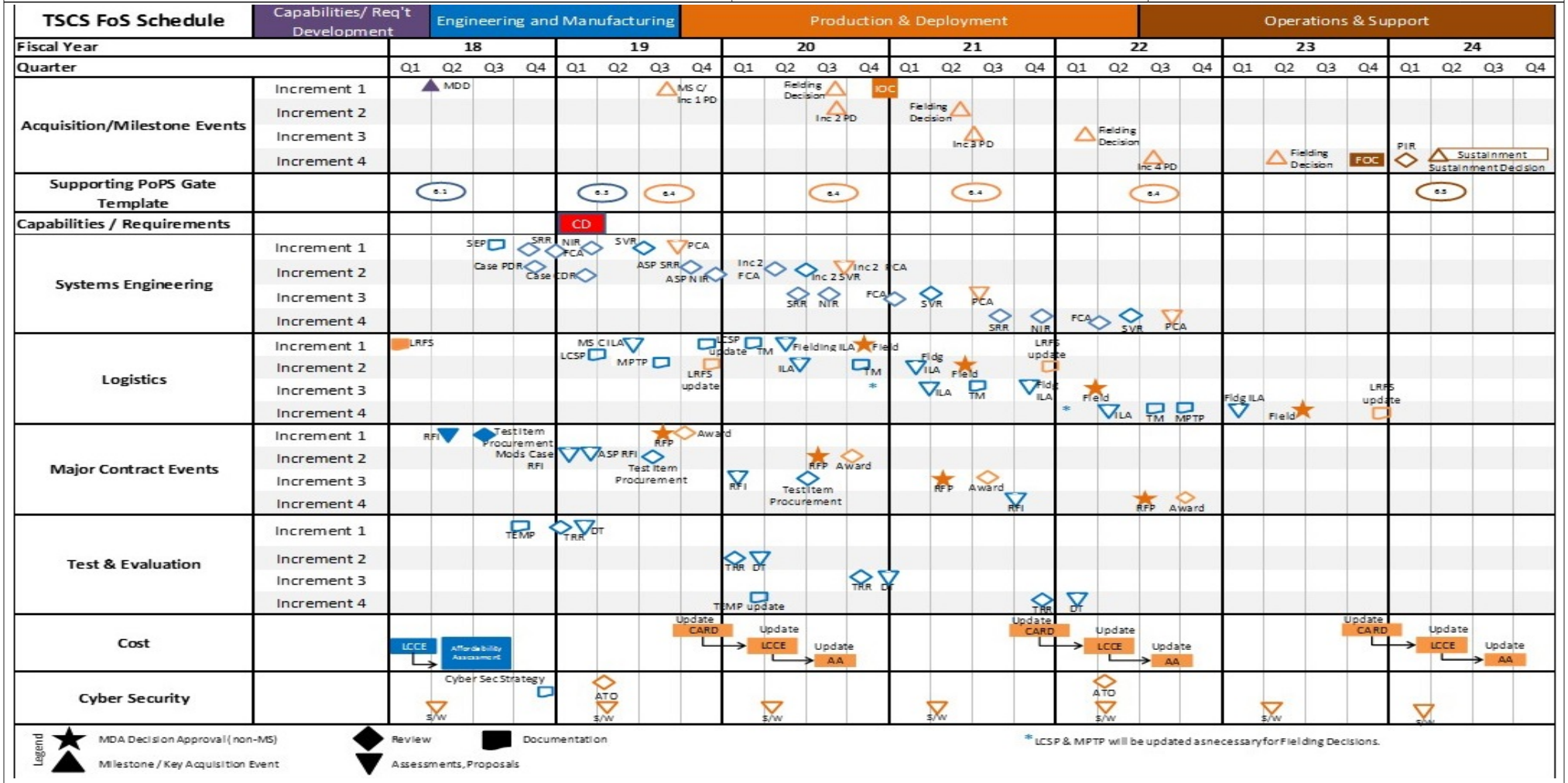


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2272				
TCAC Delivery Decision (TWS)	2	2019	2	2019
TCAC RAWS Procurement Decision	4	2019	4	2019
IAS Tier I Procurement Decision	4	2019	4	2019
SCI COMMS Monitor & Control Device Test Asset Procurement	2	2019	2	2019
SCI COMMS SPEC A Test Asset	3	2019	3	2019
SCI COMMS Monitor & Control Device Procurement	4	2019	4	2019
SCI COMMS SPEC A Procurement	4	2019	4	2019
SCI COMMS Man-Packable Test Asset Procurement	2	2020	2	2020
SCI COMMS HBSI-PT procurement	3	2020	3	2020
SCI COMMS Modem Procurement	3	2020	3	2020
CIHEP Data Processing Module (DPM) Delivery Decision	2	2018	2	2018
CIHEP Commercial Satellite Communications Set (CSCS) Procurement Decision	3	2018	3	2018
CIHEP Technical Surveillance Countermeasures (TSCM) Delivery Decision	4	2018	4	2018
CIHEP Technical Surveillance Countermeasures (TSCM) IOC	4	2018	4	2018
CIHEP Commercial Satellite Communications Set (CSCS) Delivery Decision	1	2019	1	2019
CIHEP Data Processing Module (DPM) Procurement Decision	1	2020	1	2020
CIHEP Data Processing Module Delivery Decision	4	2020	4	2020
IBR Procurement Decision (ENTR)	1	2018	1	2018
IBR Fielding Decision (ENTR)	2	2019	2	2019
IBR Initial Operational Capability (IOC) (ENTR)	2	2020	2	2020
IBR Full Operational Capability (FOC) (ENTR)	2	2022	2	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 2272 / *Intel Command and Control (C2) Sys*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
GBOSS Program Change Assessment (PCA)	1	2018	1	2018
MSIDS Delivery Decision (DD)	2	2018	2	2018
MSIDS IOC	4	2018	4	2018
TRSS Delivery Decision SMG/SMG-Lite Components (Laptops)	3	2018	3	2018
TRSS IOC/FOC SMG/SMG-LITE Components (Laptops)	4	2018	4	2018
TRSS Procurement Decision (PD) RR,UGSS,SMG/SMG-Lite Components (Common Sensor Radio- MILWAVE)	4	2018	4	2018
Terrestrial Collection: TRSS Signature Data Recorder (SDR) Procurement Decision	4	2019	4	2019
Terrestrial Collection: TRSS Hand Held Programmable Monitor (HHPM) Procurement Decision	4	2019	4	2019
Terrestrial Collection: G-BOSS Advanced Networking Components Procurement Decision	1	2020	1	2020
Terrestrial Collection: TRSS Hand Held Programmable Monitor (HHPM) Delivery Decision	3	2020	3	2020
Terrestrial Collection: MSIDS FoS FOC	4	2020	4	2020
Terrestrial Collection: GBOSS Advanced Networking Components Delivery Decision	4	2020	4	2020
CESAS LAV-EW PIK Procurement Decision	2	2018	2	2018
CESAS Man-Packable Increment II/Phase I Procurement Decision	4	2019	4	2019
TPCS-MPC Delivery Decision (Tactical Server Sleeve)	2	2019	2	2019
TSCS Procurement Decision (Increment 1)	3	2019	3	2019
TSCS Production Contract Award (Increment 1)	4	2019	4	2019
TSCS Developmental Test (Increment 2)	1	2020	1	2020
TSCS Fielding Decision (Increment 1)	3	2020	3	2020
TSCS Procurement Decision (Increment 2)	3	2020	3	2020
TSCS Production Contract Award (Increment 2)	4	2020	4	2020
TSCS Fielding Decision (Increment 2)	2	2021	2	2021

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	Project (Number/Name) 3771 / *Tactical Exploitation of National Capabilities (TENCAP)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3771: *Tactical Exploitation of National Capabilities (TENCAP)*	0.000	0.000	6.475	6.484	-	6.484	6.594	6.731	6.869	7.006	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Beginning in FY 2019, TENCAP funding has been realigned from project 2272 to 3771, Tactical Exploitation of National Capabilities. Realignment of efforts to new BLIs in FY 2019 and beyond reflects USMC Program Management Office (PMO) reorganization to improve support of USMC OPFOR.

A. Mission Description and Budget Item Justification

The Tactical Exploitation of National Capabilities (TENCAP) programs provides the innovation and adaptability necessary for the Marine Corps Intelligence Enterprise to support MAGTF operations in increasingly complex environments against technologically savvy adversaries. TENCAP exploits current national reconnaissance systems and programs by examining both technical and operational capabilities, implementing training, and sponsoring concept demonstrations to directly support Marine Corps operating forces. The goal is to pursue technologies which exploit data from national systems to enhance intelligence support to the Marine Air-Ground Task Force (MAGTF) and/or the supported Joint Task Force commander. Additionally, TENCAP supports a persistent, distributed, development, test, and certification environment that addresses critical tactical intelligence capability gaps and delivers sustainable solutions to the operating forces and Marine Corps Systems Command (MSCS) through rapid delivery of emerging technologies.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Tactical Exploitation of National Capabilities (TENCAP): Product Development & Technical Assessments	0.000	6.475	6.484	0.000	6.484
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiate development, integration, and FUE of innovative national data receipts and dissemination capabilities from insertion into MCISRE. - Continue to conduct research and development, advanced technology demonstrations, and integration of emerging technologies into the Marine Corps Intelligence, Surveillance, and Reconnaissance Enterprise (MCISRE). - Continue to support the Congressionally mandated TENCAP office and all associated ongoing activities, to include the coordination with national agencies, the intelligence community, research laboratories, private industry, and academia, for exploration of collaborative Science and Technology (S&T)/R&D efforts to bring evolutionary intelligence capabilities to the operating forces.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 3771 / *Tactical Exploitation of National Capabilities (TENCAP)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue to provide technical assessments and field utility evaluations for the integration of current and emerging intelligence capabilities into the tactical decision making process. - Continue to support operational planning and enhance operating force capabilities through the identification and development of advanced technologies for the MCISRE architecture. - Continue training and education efforts by providing the operating forces with supported simulation, visualization, and improved mission planning capabilities. - Continue efforts to provide transition support to Rapid Reliable Targeting (RRT). ***FY 2020 Base Plans:*** - Continue to conduct research and development, advanced technology demonstrations, and integration of emerging technologies into the Marine Corps Intelligence, Surveillance, and Reconnaissance Enterprise (MCISRE). - Continue to support the Congressionally mandated TENCAP office and all associated ongoing activities, to include the coordination with national agencies, the intelligence community, research laboratories, private industry, and academia, for exploration of collaborative Science and Technology (S&T)/R&D efforts to bring evolutionary intelligence capabilities to the operating forces. - Continue to provide technical assessments and field utility evaluations for the integration of current and emerging intelligence capabilities into the tactical decision making process. - Continue to support operational planning and enhance operating force capabilities through the identification and development of advanced technologies for the MCISRE architecture. - Continue training and education efforts by providing the operating forces with supported simulation, visualization, and improved mission planning capabilities. - Continue efforts to provide transition support to Rapid Reliable Targeting (RRT). - Continue development, integration, and FUE of innovative national data receipts and dissemination capabilities from insertion into MCISRE. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** There is no significant increase from FY19 to FY20.					
Accomplishments/Planned Programs Subtotals	0.000	6.475	6.484	0.000	6.484

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 3771 / *Tactical Exploitation of National Capabilities (TENCAP)*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

(U) TENCAP: All work will be led in-house and necessary contractor support will be acquired using existing contracts. Research, test and integrate new technology and conduct advanced technology demonstrations to identify the most appropriate, mature programs for theintegration of emerging technologies into the Marine Corps Intelligence, Surveillance, and Reconnaissance Enterprise (MCISR-E).

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 3771 / *Tactical Exploitation of National Capabilities (TENCAP)*

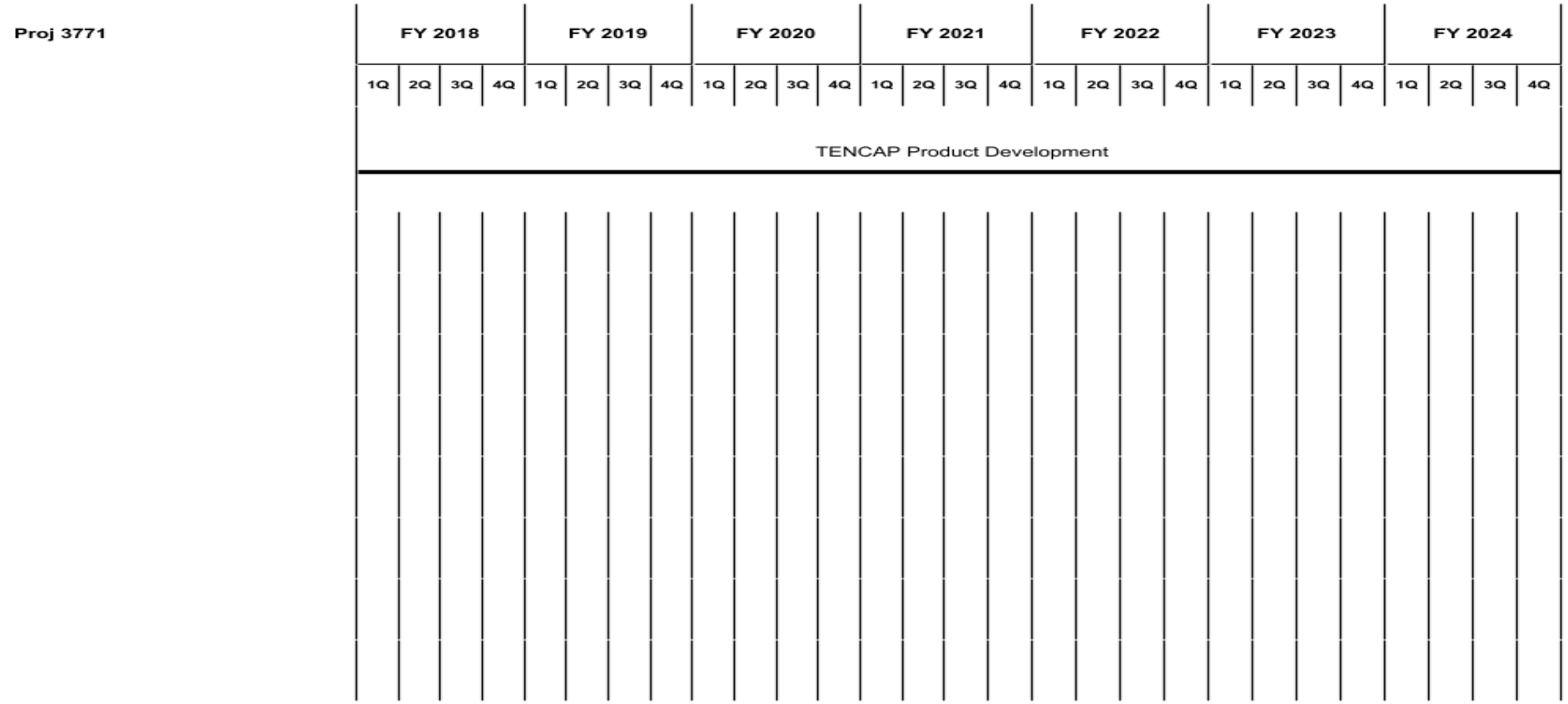
Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TENCAP	C/CPFF	DTIC : FT BELVOIR, VA	0.000	0.000		6.025	Nov 2018	6.019	Nov 2019	-		6.019	Continuing	Continuing	Continuing
TENCAP	WR	SSCLANT : CHARLESTON, SC	0.000	0.000		0.450	Oct 2018	0.465	Oct 2019	-		0.465	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		6.475		6.484		-		6.484	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		6.475		6.484		-		6.484	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 3771 / *Tactical Exploitation of National Capabilities (TENCAP)*



2020OSD - 0206625M - 3771

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206625M / *USMC Intelligence/ Electronics Warfare Sys*	**Project (Number/Name)** 3771 / *Tactical Exploitation of National Capabilities (TENCAP)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3771				
Continued RDTEN of new and emerging tech into MCISRE	1	2018	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0206629M *I (U)Amphibious Assault Vehicle*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	165.752	53.404	20.690	5.476	-	5.476	13.260	9.838	6.018	6.138	Continuing	Continuing
2938: *Amphibious Assault Vehicle*	165.752	53.404	20.690	5.476	-	5.476	13.260	9.838	6.018	6.138	Continuing	Continuing

Note

NOTE: Prior funding is reflected in P.E. 0206623M/Project 0021.

A. Mission Description and Budget Item Justification

This Program Element contains the Assault Amphibious Vehicle (AAV) Modifications Line and the terminated AAV Survivability Upgrade (AAV SU) program. The AAV Modifications Line provides life-cycle support to ensure cost-effective combat readiness for the AAV Family of Vehicles (FOV). This is accomplished through engineering changes resulting from continuous review of sub-systems to maintain system supportability, safety, reduce total ownership costs, improve fleet readiness, address obsolescence issues, and improve vehicle survivability and performance. The AAV SU program was designed to increase Personnel-Variant (P-variant) and Command-variant (C-Variant) survivability and force protection capabilities while maintaining the required land and water mobility performance.

The USMC decided to terminate the AAV Survivability Upgrade (AAV SU) program in order to better align to the National Defense Strategy; the remaining AAV SU funding will be utilized for program cancellation, which is expected to take from 12-24 months to complete. Funding to maintain and sustain the legacy AAV fleet will continue herein through the AAV Modifications Line.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	58.728	22.637	15.708	-	15.708
Current President's Budget	53.404	20.690	5.476	-	5.476
Total Adjustments	-5.324	-1.947	-10.232	-	-10.232
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.947			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.215	0.000			
• SBIR/STTR Transfer	-1.064	0.000			
• Program Adjustments	0.000	0.000	-10.202	-	-10.202
• Rate/Misc Adjustments	0.000	0.000	-0.030	-	-0.030
• Congressional Directed Reductions Adjustments	-4.045	-	-	-	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0206629M *I (U)Amphibious Assault Vehicle*

Change Summary Explanation

The decrease from FY2019 to FY2020 ($15.214M) is primarily attributed to completion of nonrecurring engineering for Hydraulic Modernization, Remote Weapons Station (RWS) Integration Studies/Analyses/Engineering, and the Common Remotely Operated Weapons System (CROWS) Integration effort in FY2020.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0206629M / *(U)Amphibious Assault Vehicle*	Project (Number/Name) 2938 / *Amphibious Assault Vehicle*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2938: *Amphibious Assault Vehicle*	165.752	53.404	20.690	5.476	-	5.476	13.260	9.838	6.018	6.138	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The decrease from FY2019 to FY2020 ($15.214M) is primarily attributed to completion of nonrecurring engineering for Hydraulic Modernization, Remote Weapons Station (RWS) Integration Studies/Analyses/Engineering, and the Common Remotely Operated Weapons System (CROWS) Integration effort in FY2020.

A. Mission Description and Budget Item Justification

The Assault Amphibious Vehicle (AAV) program provides life-cycle support to ensure cost-effective combat readiness for the AAV Family of Vehicles (FOV). This is accomplished through engineering changes resulting from continuous review of sub-systems to maintain system supportability, safety, reduce total ownership costs, improve fleet readiness, address obsolescence issues, and improve vehicle survivability and performance. The AAV program also included a Survivability Upgrade, which was designed to increase Personnel (P-Variant) and Command (C-Variant) survivability and force protection, while maintaining the required land and water mobility performance.

The USMC decided to terminate the Survivability Upgrade program in order to better align with the National Defense Strategy. Program life-cycle support for the AAV Family of Vehicles (FOV) will continue herein under the AAV Modifications Line.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	28.250	13.829	3.724	0.000	3.724
Articles:	3	-	-	-	-
Description: This cost element provides funding for design and development engineering for the AAV Modifications Line and the AAV previous Survivability Upgrade program. The AAV Modifications Line provides Nonrecurring Engineering (NRE) and design for AAV safety, obsolescence, and performance improvement engineering for the AAV Family of Vehicles (FOV). The AAV Survivability Upgrade (AAV SU) was designed to improve the legacy AAV Force Protection capability and included improvements such as upgraded underbelly protection, integrated blast mitigating seats, integrated spall liners, protected fuel storage, sponson armor, and selected improvements to maintain required water and land mobility. The USMC decided to terminate the AAV SU program in order to better align with the National Defense Strategy. ***FY 2019 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206629M / *(U)Amphibious Assault Vehicle*	**Project (Number/Name)** 2938 / *Amphibious Assault Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Complete integration and engineering analyses for Remote Weapon Station (RWS). -Complete nonrecurring efforts for design, development, integration, and test for legacy vehicle Electrical Modernization. -Cancel prime contractor support for P-variant Reliability Growth Test (RGT) and Full-Up System Level Testing (FUSL) for Survivability Upgrade. -Complete Hydraulic Modernization nonrecurring engineering efforts. -Complete Integration Studies/Analysis/Engineering efforts for Remote Weapons Station (RWS) and the integration efforts for Common Remotely Operated Weapons System (CROWS). -Continue Recovery-variant nonrecurring engineering efforts. -Continue legacy Platform Command and Control (C2) design and integration efforts to include C2 software/ hardware tech refresh. ***FY 2020 Base Plans:*** -Continue legacy Platform Command and Control (C2) design and integration efforts to include C2 software/ hardware tech refresh. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease from FY2019 to FY2020 ($10.105M) is due to the completion of Hydraulic Modernization and integration and engineering analyses for the Remote Weapon Stations (RWS) and the integration efforts for Common Remotely Operated Weapons System (CROWS) in FY2019.					
Title: Support	4.000	2.425	1.403	0.000	1.403
Articles:	-	-	-	-	-
Description: Provide government engineering and technical support for AAV safety, obsolescence, and performance modifications, and the previous Survivability Upgrade program's support. ***FY 2019 Plans:*** - Continue modeling and simulation efforts for the Hydro-Dynamic analyses. - Continue Assault Amphibious Vehicle (AAV) C7 Software Updates. - Continue to provide technical and engineering services in support of AAV obsolescence and performance modifications.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206629M / *(U)Amphibious Assault Vehicle*	**Project (Number/Name)** 2938 / *Amphibious Assault Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue utilizing the Enterprise Product Lifecycle Management Tool (ePLM) Integrated Decision Environment (IDE) to support analyses of the legacy AAV. - Continue to provide material and travel associated with these efforts. ***FY 2020 Base Plans:*** - Continue modeling and simulation efforts for the Hydro-Dynamic effort. - Continue Assault Amphibious Vehicle (AAV) C7 Software Updates. - Continue to provide technical and engineering services in support of AAV obsolescence and performance modifications. - Continue utilizing the Enterprise Product Lifecycle Management Tool (ePLM) Integrated Decision Environment (IDE) to support analyses of the legacy AAV. - Continue to provide material and travel associated with these efforts. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease from FY2019 to FY2020 ($1.022M) reflects a reduction to engineering management and technical support for nonrecurring test and evaluation and logistic support for systems integration in the areas of Hydraulic Modernization, Intercom Modernization, Tactical Communication Modernization, and Remote Weapon Stations.					
Title: Test and Evaluation	14.583	1.357	0.349	0.000	0.349
Articles:	-	-	-	-	-
Description: Developmental, Operational and Live Fire Test and Evaluation of safety improvements, upgrades, modifications and fact of life changes to ensure operational suitability and effectiveness of the AAV family of vehicles. ***FY 2019 Plans:*** - Cancel Personnel-variant Reliability Growth Testing (RGT) for Survivability Upgrade. - Initiate and complete Operational Test & Evaluation/Environmental Electromagnetic Effects (E3) testing for RWS. ***FY 2020 Base Plans:*** - Initiate Recovery-variant Developmental Test & Evaluation. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206629M / *(U)Amphibious Assault Vehicle*	**Project (Number/Name)** 2938 / *Amphibious Assault Vehicle*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease from FY2019 to FY2020 ($1.008M) is primarily attributed to the completion of Operational Test & Evaluation (OT&E)/Environmental Electromagnetic Effects (E3) testing for RWS in FY2019.					
Title: Management and Engineering Technical Services ***Articles:*** ***Description:*** Management support services and technical support for program office and field activities. ***FY 2019 Plans:*** - Continue program management services in support of ECP development, trade studies and analyses, supply chain and government property management in support of AAV sustainment modification efforts. - Continue nonrecurring logistic support for systems integration. ***FY 2020 Base Plans:*** - N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease from FY2019 to FY2020 ($3.079M) in In-House Technical Support is attributed to a reduction in management support services and technical support for the program office and field activities in light of the cancellation of the AAV Survivability Upgrade.	6.571 -	3.079 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	53.404	20.690	5.476	0.000	5.476

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/2021: *AAV Product Improvement Program*	85.362	96.836	39.495	-	39.495	94.300	88.779	39.483	40.269	67.889	1,620.187

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206629M / *(U)Amphibious Assault Vehicle*	**Project (Number/Name)** 2938 / *Amphibious Assault Vehicle*

D. Acquisition Strategy

The USMC competitively awarded two contracts in FY 2014 for development efforts in support of upgrading Personnel-variant (P-Variant) Assault Amphibious Vehicles Survivability Upgrade (AAV SU). Down-select to one contractor for manufacture of prototype vehicles occurred in February 2015. Milestone C was achieved in August 2017. The program's main focus was on improving Marine force protection capabilities. To support the required capabilities, the Survivability Upgrade program sought to incorporate Non-Developmental Items (NDI) and/or Commercial off the Shelf (COTS) solutions into the existing P-Variant and C-Variant Reliability, Availability, Maintainability/Rebuild to Standard (RAM/RS) configuration of AAV. The acquisition strategy sought to minimize cost and schedule, and maximize value, technology readiness, and commonality, while ensuring the selected manufacturer met the capability attributes established for the RAM/RS. RDT&E funded competitive designs and contract options for Engineering and Manufacturing Development (EMD). Initial Operational Capability (IOC) was scheduled for FY 2020; however, the USMC decided to terminate the program in order to better align with the National Defense Strategy. Program life-cycle support for the AAV Family of Vehicles (FOV) will continue herein under the AAV Modifications Line.

E. Performance Metrics

Milestone Reviews:
Tactical Communications Modernization (TCM) Engineering Change Proposal (ECP) approval: 1QFY2020
Recovery-variant ECP approval: 2QFY21

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206629M / *(U)Amphibious Assault Vehicle*	**Project (Number/Name)** 2938 / *Amphibious Assault Vehicle*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Syst Design & Dev / EMD	C/FFP	MCSC/SAIC : Charleston, SC	110.706	27.366	Feb 2018	12.898	Feb 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Syst Design & Dev	C/FFP	Various : Various	0.000	0.000		0.000		3.478	Feb 2020	-		3.478	0.000	3.478	-
Other Product Development	C/BA	Various : Various	5.144	0.884	Mar 2018	0.931	Mar 2019	0.246	Mar 2020	-		0.246	Continuing	Continuing	Continuing
		Subtotal	115.850	28.250		13.829		3.724		-		3.724	Continuing	Continuing	N/A

Remarks

The decrease from FY2019 to FY2020 ($10.105M) is due to the completion of Hydraulic Modernization and integration and engineering analyses for the Remote Weapon Stations (RWS) and the integration efforts for the Common Remotely Operated Weapons Station (CROWS) in FY2019.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Various	Various : Various	0.778	0.250	Oct 2017	0.047	Oct 2018	0.047	Oct 2019	-		0.047	Continuing	Continuing	Continuing
In-House Technical Support	Various	Various : Various	17.528	3.750	Feb 2018	2.378	Feb 2019	1.356	Feb 2020	-		1.356	Continuing	Continuing	Continuing
		Subtotal	18.306	4.000		2.425		1.403		-		1.403	Continuing	Continuing	N/A

Remarks

The decrease from FY2019 to FY2020 ($1.022M) reflects a reduction to engineering management and technical support for nonrecurring test and evaluation and logistic support for systems integration in the areas of Hydraulic Modernization, Intercom Modernization, Tactical Communication Modernization, and Remote Weapon Stations.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing (DT)	Various	Various : Various	7.391	9.590	Feb 2018	0.000		0.349	Feb 2020	-		0.349	Continuing	Continuing	Continuing
Operational Testing (OT)	WR	MCOTEA : Quantico, VA	1.022	0.000		1.357	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206629M / *(U)Amphibious Assault Vehicle*	**Project (Number/Name)** 2938 / *Amphibious Assault Vehicle*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Live Fire Test and Evaluation (LFT&E)	Various	Various : Various	3.646	4.993	Mar 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	12.059	14.583		1.357		0.349		-		0.349	Continuing	Continuing	N/A

Remarks

The decrease from FY2019 to FY2020 ($1.008M) is primarily attributed to the completion of Operational Test & Evaluation (OT&E)/Environmental Electromagnetic Effects (E3) testing for RWS in FY2019.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Support Svcs	C/FFP	MCSC : Quantico, VA	6.802	5.174	Apr 2018	1.996	Apr 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Engineering and Technical Services	Various	Various : Various	12.735	1.397	Mar 2018	1.083	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	19.537	6.571		3.079		0.000		-		0.000	Continuing	Continuing	N/A

Remarks

The decrease from FY2019 to FY2020 ($3.079M) in In-House Technical Support is attributed to a reduction in management support services and technical support for the program office and field activities in light of the cancellation of the AAV Survivability Upgrade.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	165.752	53.404		20.690		5.476		-		5.476	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206629M / *(U)Amphibious Assault Vehicle*	**Project (Number/Name)** 2938 / *Amphibious Assault Vehicle*

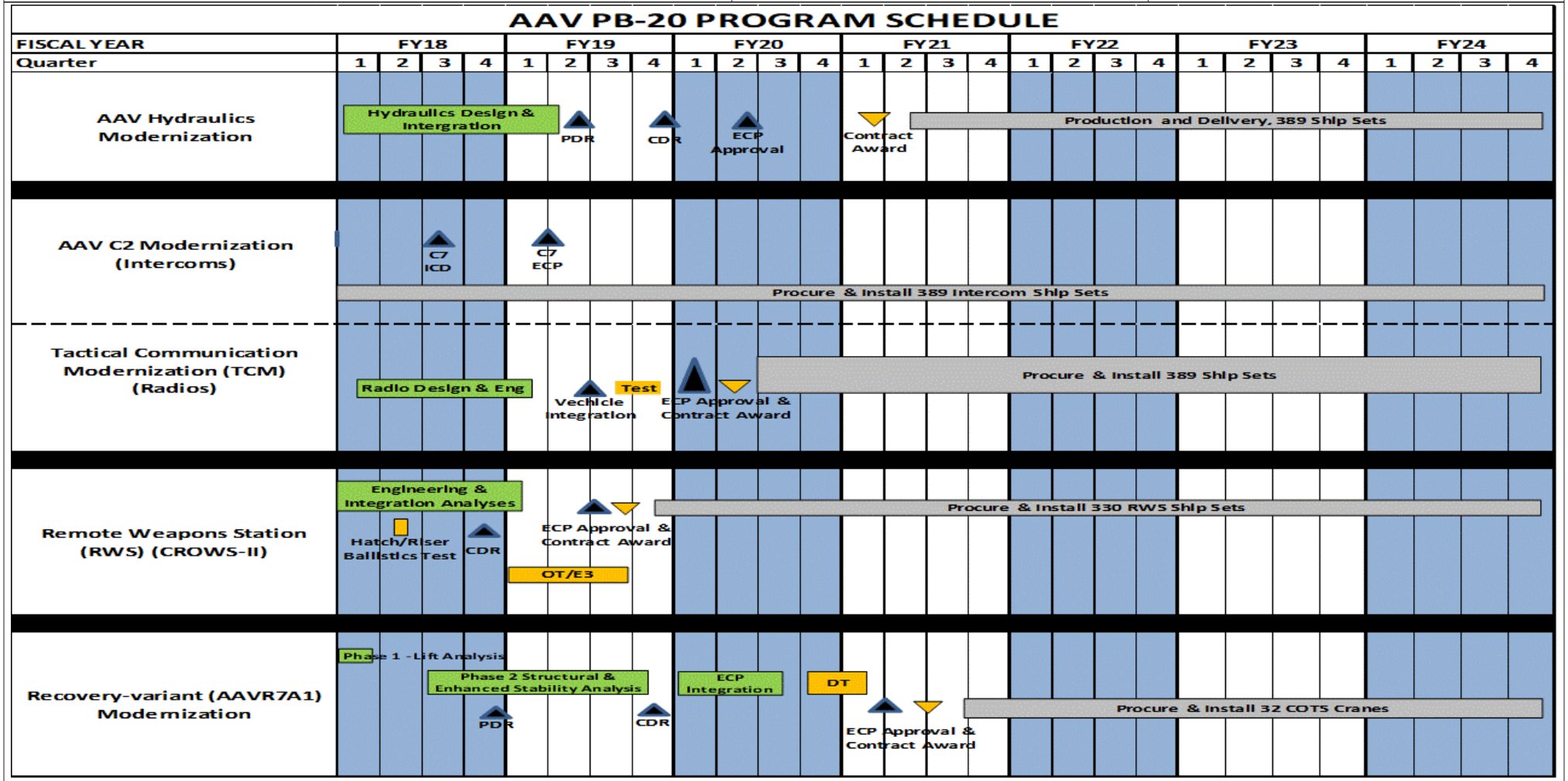

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0206629M / *(U)Amphibious Assault Vehicle*	**Project (Number/Name)** 2938 / *Amphibious Assault Vehicle*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2938				
PDR - Hydraulics Modernization	2	2019	2	2019
CDR - Hydraulics Modernization	4	2019	4	2019
ECP Approval - Hydraulics Modernization	2	2020	2	2020
Tactical Communications Modernization (TCM) Design & Develop	1	2018	1	2019
TCM Integration & Test	2	2019	4	2019
TCM - ECP Approval	1	2020	1	2020
TCM - Contract Award	2	2020	2	2020
Remote Weapon Station (RWS) - Engineering & Integration Analyses	1	2018	1	2019
RWS - OT/E3	1	2019	3	2019
RWS - ECP Approval & Contract Award	3	2019	3	2019
Recovery-Variant (AAVR7) Modernization - Phase 2 Struct & Stab Analyses	3	2018	4	2019
CDR - AAVR7 Modernization	4	2019	4	2019
ECP Integration - AAVR7 Modernization	1	2020	3	2020
DT - AAVR7 Modernization	4	2020	1	2021
ECP Approval & Contract Award - AAVR7 Modernization	2	2021	2	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0207161N *I Tactical Aim Missiles*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	478.751	34.063	40.121	19.488	-	19.488	6.946	0.345	0.348	0.349	0.000	580.411
0457: *AIM-9X*	478.751	34.063	40.121	19.488	-	19.488	6.946	0.345	0.348	0.349	0.000	580.411
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 442												

A. Mission Description and Budget Item Justification

The AIM-9X Block II/II+ Sidewinder (AIM-9X Blk II/II+) continues the evolution of the AIM-9 series of missiles. This missile program delivers a launch and leave, air combat munition that uses passive Infrared (IR) energy to acquire and track enemy air targets and complements the radar guided Advanced Medium Range Air-to-Air Missile (AMRAAM). F/A-18 first shot, first kill opportunities while conducting basic fighter maneuvering (dogfighting) Within Visual Range (WVR) are essential for aircrew survival. The AIM-9X provides these opportunities with unmatched offensive and defensive capabilities against threats WVR, even when IR countermeasures are employed. The AIM-9X also provides air superiority in the Beyond Visual Range (BVR) air-to-air battle. Anti-tamper features have been incorporated to protect improvements inherent in this design. The AIM-9X Block II missile is critical for projecting power and winning decisively against threats identified in Defense Planning Guidance and the Navy's Navigation Plan.

AIM-9X is a Post Milestone C, Acquisition Category IC (ACAT-IC) joint service program led by the Department of the Navy. The Block II program has completed independent operational testing and found to be operationally effective and operational/suitable. The program achieved Navy Initial Operational Capability (IOC) in March 2015 and received Full Rate Production decision in August 2015. The first Full Rate Production Lot contract was awarded in September 2015. This budget line will continue technical refresh of critical obsolete components, implement cost reduction initiatives, improve insensitive munitions performance, correct deficiencies, and increase capabilities through software enhancements, and conduct testing to ensure platform integration onto threshold US Navy aircraft.

This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

The USN & USAF require additional quantities beyond the approved APB (Change 1: 31 Aug 2015); an update is in staffing for approval.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0207161N *I Tactical Aim Missiles*			
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	42.884	40.121	20.053	-	20.053
Current President's Budget	34.063	40.121	19.488	-	19.488
Total Adjustments	-8.821	0.000	-0.565	-	-0.565
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.778	0.000			
• SBIR/STTR Transfer	-1.123	0.000			
• Program Adjustments	0.000	0.000	-0.567	-	-0.567
• Rate/Misc Adjustments	0.000	0.000	0.002	-	0.002
• Congressional Directed Reductions Adjustments	-5.920	-	-	-	-

Change Summary Explanation

In March 2018, the prime System Improvement Program contract with Raytheon was modified to add scope to mitigate Missile Processor obsolescence. The program schedule has been updated to incorporate the additional scope for the processor upgrade and the accompanying v10.4 software which will complete in first quarter FY22. Consequently, the Critical Design Review is now planned for second quarter FY20 and the Lot 20 Engineering Change Proposal in second quarter FY21.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0207161N / *Tactical Aim Missiles*	Project (Number/Name) 0457 / *AIM-9X*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0457: *AIM-9X*	478.751	34.063	40.121	19.488	-	19.488	6.946	0.345	0.348	0.349	0.000	580.411
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 442

A. Mission Description and Budget Item Justification

The AIM-9X Block II/II+ Sidewinder (AIM-9X Blk II/II+) continues the evolution of the AIM-9 series of missiles. This missile program delivers a launch and leave, air combat munition that uses passive Infrared (IR) energy to acquire and track enemy air targets and complements the radar guided Advanced Medium Range Air-to-Air Missile (AMRAAM). F/A-18 first shot, first kill opportunities while conducting basic fighter maneuvering (dogfighting) Within Visual Range (WVR) are essential for aircrew survival. The AIM-9X provides these opportunities with unmatched offensive and defensive capabilities against threats WVR, even when IR countermeasures are employed. The AIM-9X also provides air superiority in the Beyond Visual Range (BVR) air-to-air battle. Anti-tamper features have been incorporated to protect improvements inherent in this design. The AIM-9X Block II missile is critical for projecting power and winning decisively against threats identified in Defense Planning Guidance and the Navy's Navigation Plan.

This line item continues Technical Refresh of components and software, as well as incorporates advanced development products and capabilities, to meet threshold requirements of the capabilities production document. Specifically, the program will redesign, develop and integrate components facing obsolescence, implement cost reduction initiatives, enhance insensitive munitions performance, incrementally improve operational flight software to fully utilize capabilities of the missile, and improvements in anti-tamper and cyber security technology.

The program strategy is to redesign the control actuation system (CAS) battery, and incorporate it into the Lot 18 (FY 2018) production missile. Next, the program will complete missile software improvements (software version 9.4) and release it into Lot 19 (FY 2019) and prior missiles. The software will provide improved enemy flare rejection (infrared counter-countermeasures), partial and degraded cueing, beyond visual range engagement capabilities, improve small target acquisition (cruise missile and UAV), and provide surface attack capability over land and sea.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	26.945	27.049	8.611	0.000	8.611
Articles:	-	-	-	-	-
Description: Continuation of Primary Hardware Development/Pre-Planned Product Improvement (Tech Refresh) efforts for the AIM-9X weapon system. This includes Systems Engineering / Program management, as well as support required, to ensure AIM-9X missile integration with threshold US Navy aircraft platforms. This also includes efforts to redesign missile components in order to resolve Block II component obsolescence to ensure missile producibility and increase reliability beyond Lot 20. Incorporate anti-tamper and cyber security					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207161N / *Tactical Aim Missiles*	**Project (Number/Name)** 0457 / *AIM-9X*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
technology improvements, and implement cost reduction initiatives, and to comply with the Insensitive Munitions (IM) requirements as established by Joint Requirements Oversight Council memo dated 11 February 2009. ***FY 2019 Plans:*** Complete v9.317 software release to resolve aircraft employment deficiencies discovered during Block II integration testing. Continue Engineering Manufacturing Development required to redesign, integrate, test and qualify components due to obsolescence and implement cost reduction initiatives. Incorporate anti-tamper and cyber security technology improvements. Continue to develop v9.4 Block II software improvements to pace the threat and fully utilize the capabilities of the missile. Continue to develop missile hardware design improvements necessary to enhance IM performance. ***FY 2020 Base Plans:*** Continue Engineering Manufacturing Development required to redesign, integrate, test and qualify components due to obsolescence and implement cost reduction initiatives. Continue to develop v9.4 Block II software improvements to pace the threat and fully utilize the capabilities of the missile. Incorporate anti-tamper and cyber security technology improvements. Continue to develop missile hardware design improvements necessary to enhance IM performance. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease in FY 2020 reflects the completion of the development activities associated with the obsolescence redesign of missile components and v9.4 software improvements.					
Title: Test and Evaluation Activities and Support	6.911	12.865	10.770	0.000	10.770
Articles:	-	-	-	-	-
Description: Test and Evaluation (T&E) and associated governmental support required to ensure the AIM-9X missile integration with threshold US Navy aircraft platforms (F/A-18A+/C/D/E/F). Developmental and Operational testing of Operation Flight Software v9.4. ***FY 2019 Plans:*** Continue Developmental Testing and Integrated Testing (DT/IT-D1) planning of Operational Flight Software v9.4 including improvements associated with further integrating the F/A-18 aircraft to utilize the full capabilities of the Block II missile. ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207161N / *Tactical Aim Missiles*	**Project (Number/Name)** 0457 / *AIM-9X*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete Developmental Testing and Integrated Testing (DT/IT-D1) of Operational Flight Software v9.4 including improvements associated with further integrating the F/A-18 aircraft to utilize the full capabilities of the Block II missile. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease in FY 2020 reflects planned Developmental and Integrated Testing to be conducted at the Naval Air Warfare Center and at Commander Operational Test Force to incorporate software v9.4 improvements into the missile.					
Title: Management Services ***Articles:*** ***Description:*** Transportation / Travel for AIM-9X efforts in supporting the major test events and program decisions identified in the Product Development and Test and Evaluation sections above. ***FY 2019 Plans:*** Continue funding transportation and travel costs associated with AIM-9X missile program efforts supporting the major test events and program decisions identified in the Product Development and Test and Evaluation sections above. ***FY 2020 Base Plans:*** Continue funding transportation and travel costs associated with AIM-9X missile program efforts supporting the major test events and program decisions identified in the Product Development and Test and Evaluation sections above. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** AIM-9X transportation and travel costs decrease from FY2019 to FY2020 as Product Development and Test and Evaluation activities ramp down in accordance with the program schedule.	0.207 -	0.207 -	0.107 -	0.000 -	0.107 -
Accomplishments/Planned Programs Subtotals	34.063	40.121	19.488	0.000	19.488

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207161N / *Tactical Aim Missiles*	**Project (Number/Name)** 0457 / *AIM-9X*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN 2209: *Sidewinder*	76.915	121.481	119.456	-	119.456	127.446	114.784	99.749	101.745	52.484	1,670.954
• MPAF 3479: *Sidewinder*	125.350	121.253	160.408	-	160.408	164.987	117.621	121.983	120.545	1,630.835	3,829.885
• RDTE, AF 41: *Sidewinder*	36.303	37.230	10.314	-	10.314	19.452	26.801	21.226	14.281	Continuing	Continuing

Remarks

D. Acquisition Strategy

Milestone C decision for LRIP was held June 24, 2011. The program received USN Initial Operational Capability (IOC) in March 2015 and Full Rate Production (FRP) Approval in August 2015. The program awarded the FRP-3 contract option in March 2017. The program awarded FRP-4 in December 2018 with an option for FRP-5 in February 2019.

E. Performance Metrics

AIM-9X Block II:

1. Complete v9.317 software release to resolve aircraft employment deficiencies found during Block II integration testing (4Q FY 2018).

AIM-9X Block II Tech Refresh:

1. Complete Lot 18 Cut In Engineering Change Proposal to incorporate redesigned control actuation system battery into production (3Q FY 2019).
2. Complete Development Testing (DT-D1) for software v9.4 improvements (1Q FY 2019).
3. Complete (DT/IT-D1) for software v9.4 improvements (4Q FY 2019).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0207161N / *Tactical Aim Missiles*	Project (Number/Name) 0457 / *AIM-9X*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware & Software Development	SS/CPFF	Raytheon Missile Systems : Tucson, AZ	103.543	22.255	Mar 2018	22.594	Feb 2019	8.236	Feb 2020	-		8.236	4.097	160.725	160.725
Aircraft Integration - USG	WR	NAWCWD : China Lake, CA	23.724	0.372	Nov 2017	0.000		0.000		-		0.000	0.000	24.096	-
USG Systems Engineering & Project Managment Support	WR	NAWC AD : Patuxent River, MD	1.277	0.361	Jan 2018	0.368	Feb 2019	0.375	Feb 2020	-		0.375	0.000	2.381	-
USG Systems Engineering & Project Managment Support	WR	NAWCWD : China Lake, CA	7.703	3.957	Dec 2017	4.087	Feb 2019	0.000		-		0.000	0.000	15.747	-
Prior Year Prod Dev cost no longer funded in the FYDP	Various	Various : Various	267.484	0.000		0.000		0.000		-		0.000	0.000	267.484	-
		Subtotal	403.731	26.945		27.049		8.611		-		8.611	4.097	470.433	N/A

Remarks

1. Total prior years - FY95 and prior under PE 0603715D.
2. The decrease in Primary Hardware & Software Development in FY 2020 reflects curtailing the development activities associated with the obsolescence redesign of missile components and v9.4 software upgrade.
3. The decrease in USG Systems Engineering & Project Management from FY 2019 to FY 2020 reflects completion of tech refresh improvements into the final hardware and software design, and Insensitive Munitions development activities at China Lake.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Tech Support	Various	Various : Various	0.000	0.147	May 2018	0.000		0.000		-		0.000	0.000	0.147	-
Prior Year Support Costs	C/CPFF	Various : Various	2.374	0.000		0.000		0.000		-		0.000	0.000	2.374	-
		Subtotal	2.374	0.147		0.000		0.000		-		0.000	0.000	2.521	N/A

Remarks

Provides one-time engineering and management services in support of air to air weapons development, testing, and integration support.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0207161N / *Tactical Aim Missiles*	Project (Number/Name) 0457 / *AIM-9X*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Oper Test & Eval	WR	COMOPTEVFOR : Norfolk, VA	8.968	0.845	Feb 2018	3.933	Mar 2019	3.973	Mar 2020	-		3.973	0.511	18.230	-
Oper Test & Eval (NAWC CL) (GOVT)	WR	NAWCWD : China Lake, CA	11.414	5.919	Dec 2017	8.932	Mar 2019	6.797	Mar 2020	-		6.797	3.251	36.313	-
Prior year T&E cost no longer funded in the FYDP	Various	Various : Various	40.382	0.000		0.000		0.000		-		0.000	0.000	40.382	-
		Subtotal	60.764	6.764		12.865		10.770		-		10.770	3.762	94.925	N/A

Remarks

Decrease in Development Test at China Lake between FY 2019 and FY 2020 reflects the remaining DT/IT-D1 efforts to test software v9.4 improvements in accordance with the test and evaluation master plan (TEMP) revision after Block II.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Transportation - Material	WR	NAVAIR : Patuxent River, MD	0.603	0.075	Oct 2017	0.075	Oct 2018	0.075	Oct 2019	-		0.075	0.000	0.828	-
Travel - Obligation throughout the year	WR	NAWCAD : Patuxent River, MD	3.246	0.132	Oct 2017	0.132	Oct 2018	0.032	Oct 2019	-		0.032	0.129	3.671	-
Prior Year Mgmt cost no longer funded in the FYDP	Various	Various : Various	8.033	0.000		0.000		0.000		-		0.000	0.000	8.033	-
		Subtotal	11.882	0.207		0.207		0.107		-		0.107	0.129	12.532	N/A

Remarks

Provides transportation of test assets, as well as travel of persons, in support of the AIM-9X Block II System Improvement Program (SIP) III project.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	478.751	34.063		40.121		19.488		-		19.488	7.988	580.411	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207161N / *Tactical Aim Missiles*	**Project (Number/Name)** 0457 / *AIM-9X*

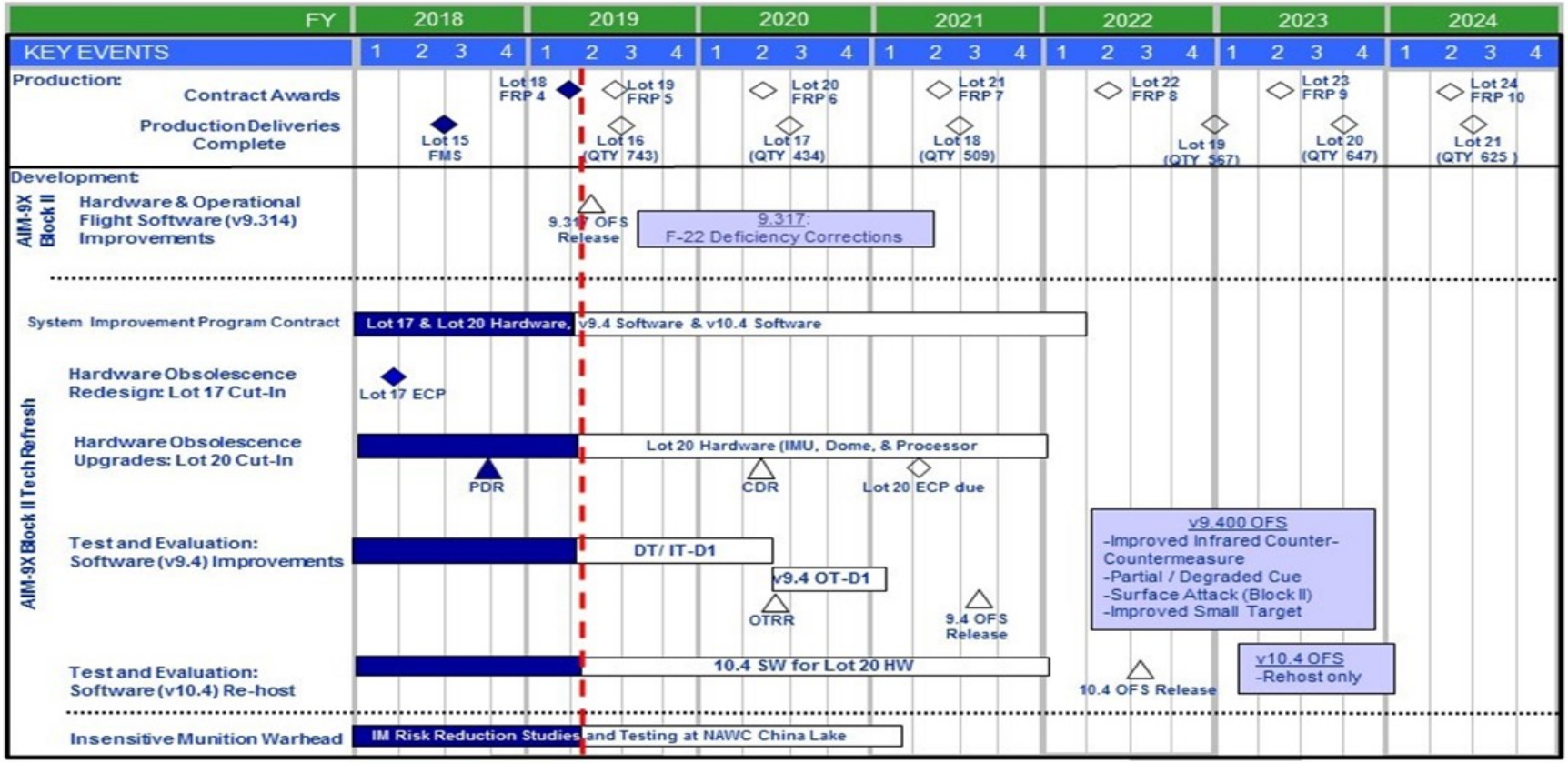

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207161N / *Tactical Aim Missiles*	**Project (Number/Name)** 0457 / *AIM-9X*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
TACTICAL AIM MISSILES				
Production Milestones - Block II: Contract Awards: Lot 18 (FRP 4)	2	2019	2	2019
Production Milestones - Block II: Contract Awards: Lot 19 (FRP 5)	2	2019	2	2019
Production Milestones - Block II: Contract Awards: Lot 20 (FRP 6)	2	2020	2	2020
Production Milestones - Block II: Contract Awards: Lot 21 (FRP 7)	2	2021	2	2021
Production Milestones - Block II: Contract Awards: Lot 22 (FRP 8)	2	2022	2	2022
Production Milestones - Block II: Contract Awards: Lot 23 (FRP 9)	2	2023	2	2023
Production Milestones - Block II: Contract Awards: Lot 24 (FRP 10)	2	2024	2	2024
Production Deliveries: Lot 15 (FRP 1)	3	2018	4	2018
Production Deliveries: Lot 16 (FRP 2)	3	2019	4	2019
Production Deliveries: Lot 17 (FRP 3)	3	2020	4	2020
Production Deliveries: Lot 18 (FRP 4)	3	2021	4	2021
Production Deliveries: Lot 19 (FRP 5)	1	2023	2	2023
Production Deliveries: Lot 20 (FRP 6)	4	2023	4	2023
Production Deliveries: Lot 21 (FRP 7)	3	2024	4	2024
AIM-9X Block II: System Improvement Program Contract Award: System Improvement Program II Engineering Manufacturing Development Contract	1	2018	1	2022
AIM-9X Block II: Hardware & Software (v9.3) Improvements: Operational Flight Software Release v9.317	2	2019	2	2019
AIM-9X Block II Tech Refresh: Tech Refresh Development Contracts: System Improvement Program III Engineering Manufacturing Development Contract	4	2018	1	2022
AIM-9X Block II Tech Refresh: Hardware Obsolescence Redesign: Lot 17 Cut In: Lot 17 Hardware Cut-In Engineering Change Proposal	1	2018	1	2018

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207161N / *Tactical Aim Missiles*	**Project (Number/Name)** 0457 / *AIM-9X*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
AIM-9X Block II Tech Refresh: Hardware Obsolescence Redesign: Lot 20 Cut In: Hardware (IMU, Dome & Processor)	2	2019	1	2022
AIM-9X Block II Tech Refresh: Hardware Obsolescence Redesign: Lot 20 Cut In: Lot 20 Hardware Cut-In Preliminary Design Review	4	2018	4	2018
AIM-9X Block II Tech Refresh: Hardware Obsolescence Redesign: Lot 20 Cut In: Lot 20 Hardware Cut-In Critical Design Review	2	2020	2	2020
AIM-9X Block II Tech Refresh: Hardware Obsolescence Redesign: Lot 20 Cut In: Lot 20 Hardware Cut-In Engineering Change Proposal	2	2021	2	2021
AIM-9X Block II Tech Refresh: Test and Evaluation: Software (v9.4) Improvements: Development Testing	2	2019	1	2020
AIM-9X Block II Tech Refresh: Test and Evaluation: Software (v9.4) Improvements: Development Test / Integrated Testing	2	2019	1	2020
AIM-9X Block II Tech Refresh: Test and Evaluation: Software (v9.4) Improvements: Operational Test Readiness Review	2	2020	2	2020
AIM-9X Block II Tech Refresh: Test and Evaluation: Software (v9.4) Improvements: Operational Testing	2	2020	1	2021
AIM-9X Block II Tech Refresh: Test and Evaluation: Software (v9.4) Improvements: Software v9.4 Release	3	2021	3	2021
AIM-9X Block II Tech Refresh: Test and Evaluation: Software (v10.x) Rehost: Software v10.4 Development Testing	1	2021	4	2021
AIM-9X Block II Tech Refresh: Test and Evaluation: Software (v10.x) Rehost: Software v10.4 Operational Flight Software Release	3	2022	3	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0207163N *I AMRAAM*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	193.264	29.486	28.235	39.029	-	39.029	37.319	28.190	25.622	26.133	49.446	456.724
0981: *AMRAAM*	193.264	29.486	28.235	39.029	-	39.029	37.319	28.190	25.622	26.133	49.446	456.724
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 185												

A. Mission Description and Budget Item Justification

This joint Navy/Air Force program is structured in response to the Joint Service Operational Requirement and Mission Element Need Statement to develop an air superiority air-to-air missile with significant improvements in operational utility and combat effectiveness. This program supports the integration of the Advanced Medium Range Air-to-Air Missile (AMRAAM) into Navy aircraft with analysis of Navy unique applications, aircraft missile integration tasks, product improvement efforts including missile software upgrade development and procurement of hardware to support Navy test and evaluation tasks. The development program enhances AMRAAM capability and operational flexibility against current and projected threats, incorporates high payoff technology development, performs risk reduction activities, and investigates new variants and/or alternate missions that may use AMRAAM attributes. Funding in FY 2020 through FY 2024 supports Navy unique Test & Evaluation for Navy fielding of improved capability via System Improvement Program (SIP).

This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	25.364	32.473	35.853	-	35.853
Current President's Budget	29.486	28.235	39.029	-	39.029
Total Adjustments	4.122	-4.238	3.176	-	3.176
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-4.238			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	4.914	0.000			
• SBIR/STTR Transfer	-0.792	0.000			
• Program Adjustments	0.000	0.000	3.236	-	3.236
• Rate/Misc Adjustments	0.000	0.000	-0.060	-	-0.060

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0207163N *I AMRAAM*

Change Summary Explanation

The FY 2020 funding request was increased by $10.794 million to develop a software solution for AIM-120C3-C7 to improve missile performance against a rapidly advancing threat and to complete flight test requirements and Hardware-in-the Loop Facility efforts to support 5th generation aerial target emulation.

Technical: FY 2020 includes funding for improved missile performance at longer range, increased survivability, improved lethality via System Improvement Program (SIP) efforts through software development, simulation and test efforts, and 5th generation aerial target emulation efforts.

Schedule: N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7				R-1 Program Element (Number/Name) PE 0207163N / *AMRAAM*				Project (Number/Name) 0981 / *AMRAAM*				
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
0981: *AMRAAM*	193.264	29.486	28.235	39.029	-	39.029	37.319	28.190	25.622	26.133	49.446	456.724
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 185

A. Mission Description and Budget Item Justification

This joint Navy/Air Force program is structured in response to the Joint Service Operational Requirement and Mission Element Need Statement to develop an air superiority air-to-air missile with significant improvements in operational utility and combat effectiveness. This program supports the integration of the Advanced Medium Range Air-to-Air Missile (AMRAAM) into Navy aircraft with analysis of Navy unique applications, aircraft missile integration tasks, product improvement efforts including missile software upgrade development and procurement of hardware to support Navy test and evaluation tasks. Funding in FY 2020 through FY 2024 supports Navy unique Test & Evaluation for Navy fielding of improved capability via SIP.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Test and Evaluation	12.338	13.972	15.939	0.000	15.939
Articles:	-	-	-	-	-
Description: Test and Evaluation (T&E) and associated governmental support required to ensure AIM-120 missile integration with threshold US Navy aircraft platforms (F/A-18 C/D/E/F/G and F-35). Increased funding in FY20 is required due to additional flight test requirements and Hardware-in-the Loop Facility efforts to support 5th generation aerial target emulation.					
FY 2019 Plans: Complete EPIP Advanced Tape 2 OT test report and generate the fielding decision for EPIP Advanced Tape 2 fielding decision for F/A-18 aircraft in 2QFY19. Complete AIM-120D SIP-2 OT test events, supply inputs to the OT test report and generate the fielding decision for SIP-2 on F/A-18 aircraft in 4QFY19. Provide necessary documentation and provide test results for SIP-3 DT events. Evaluate Hardware-in-the-Loop Facility to support 5th generation aerial target emulation initiatives. Continue to provide test support to complete AIM-120D SIP DT and OT events.					
FY 2020 Base Plans: Continue AIM-120D SIP support, Hardware-in-the-Loop activities to include 5th generation aerial target emulation efforts, software update candidates, weapon systems of systems evaluation against current and emerging threats. Continue to provide test support to complete AIM-120D SIP-3 DT and OT events.					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207163N / *AMRAAM*	**Project (Number/Name)** 0981 / *AMRAAM*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in FY20 is to support 5th generation aerial target emulation efforts.					
Title: System Improvement Program (SIP) Efforts	17.148	14.263	23.090	0.000	23.090
Articles:	-	-	-	-	-
Description: Continuation of System Improvement Program (SIP)/Technical Maturity and Risk Reduction (TMRR) efforts for the AMRAAM weapon system. These include systems engineering, program management, missile software and/or hardware upgrades to increase capability, survivability, lethality, as well as aircraft Operational Flight Profile updates on a recurring basis. EPIP Advanced Tape 1 and Tape 2 capability improvements on the C7 missile variant will be incorporated into AIM-120D SIP-2 and 3 software updates. AIM-120D SIP-3 software will be re-hosted in AIM-120D3 hardware. ***FY 2019 Plans:*** Complete SIP-2 OT events required for fielding decision for the AIM-120D software improvement. Complete AIM-120C7 EPIP Advanced Tape 2 OT efforts and field Tape 2 in the AIM-120C7 variant. Continue AIM-120D SIP-3 development efforts. Award AIM-120D SIP-4 Risk Reduction contract and begin technology maturation and risk reduction. ***FY 2020 Base Plans:*** Complete SIP-3 development efforts to include SIP-3 Integrated Test (IT). Complete SIP-3 Functional Configuration Audit (FCA) and support dedicated OT. Continue SIP-4 TMRR and AIM-120D SIP candidate selection process to analyze solutions for warfighter's deficiencies and enhancements. Begin SIP3F development to re-host SIP-3 software on AIM-120D3 hardware. Award advanced C3-C7 software contract to address advancing threat. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increased funding in FY20 is required due to start of SIP3F development to re-host SIP-3 software on AIM-120D3 hardware and to address AIM-120C3-C7 missile performance against rapidly advancing threat.					
Accomplishments/Planned Programs Subtotals	29.486	28.235	39.029	0.000	39.029

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207163N / *AMRAAM*	**Project (Number/Name)** 0981 / *AMRAAM*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN/ 2206: *AMRAAM*	185.285	188.441	224.502	-	224.502	354.160	359.358	367.390	374.737	0.000	4,595.098
• MPAF/3479: *AMRAAM*	304.327	340.486	392.150	-	392.150	464.324	421.970	425.182	455.956	1,087.172	13,271.622
• RDTE,AF/673777: *AMRAAM*	61.322	61.393	65.965	-	65.965	67.114	68.508	69.756	71.012	344.090	1,365.043

Remarks

D. Acquisition Strategy

AMRAAM production procurements will continue across the FYDP with periodic pre-planned technical design refreshes and value engineering change proposals.

AMRAAM's Acquisition Program Baseline (APB) was updated on 28 Oct 2015.

E. Performance Metrics

Meeting cost, schedule, performance, funding and life cycle sustainment requirements in accordance with the Acquisition Program Baseline.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0207163N / *AMRAAM*	Project (Number/Name) 0981 / *AMRAAM*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hdw Development (EGLIN)	SS/CPAF	RAYTHEON COMPANY : Tucson AZ	84.863	9.175	Jan 2018	11.444	Jan 2019	18.935	Jan 2020	-		18.935	133.619	258.036	258.036
Award Fees (EGLIN)	SS/CPAF	RAYTHEON COMPANY : Tucson AZ	13.480	1.619	Jan 2018	2.019	Jan 2019	3.342	Jan 2020	-		3.342	23.580	44.040	44.040
Primary Hdw Development (NAWCAD)	WR	NAWCAD : Patuxent River MD	4.014	0.296	Nov 2017	0.302	Nov 2018	0.307	Nov 2019	-		0.307	2.684	7.603	-
Prior Years Dev Cost no longer funded in the FYDP	Various	Various : Various	26.921	0.000		0.000		0.000		-		0.000	0.000	26.921	-
Primary Hdw Development (NAWCWD)	WR	NAWCWD : China Lake, CA	0.000	5.556	May 2018	0.000		0.000		-		0.000	0.000	5.556	-
		Subtotal	129.278	16.646		13.765		22.584		-		22.584	159.883	342.156	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support (NSMA)	WR	NAVY SYST MGT ACT : Arlington VA	4.500	0.000	Jan 2018	0.000	Jan 2019	0.000		-		0.000	0.000	4.500	-
Prior Years Support costs no longer funded in the FYDP	Various	Various : Various	19.295	0.000		0.000		0.000		-		0.000	0.000	19.295	-
		Subtotal	23.795	0.000		0.000		0.000		-		0.000	0.000	23.795	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Dev Test & Eval (NAWCWD)	WR	NAWCWD : China Lake CA	32.194	11.337	Nov 2017	12.977	Nov 2018	14.927	Nov 2019	-		14.927	52.933	124.368	-
Oper Test & Eval	WR	COMOPTEVFOR : Norfolk, VA	0.595	1.011	Mar 2018	0.995	Mar 2019	1.013	Mar 2020	-		1.013	8.829	12.443	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0207163N / *AMRAAM*	Project (Number/Name) 0981 / *AMRAAM*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	32.789	12.348		13.972		15.940		-		15.940	61.762	136.811	N/A

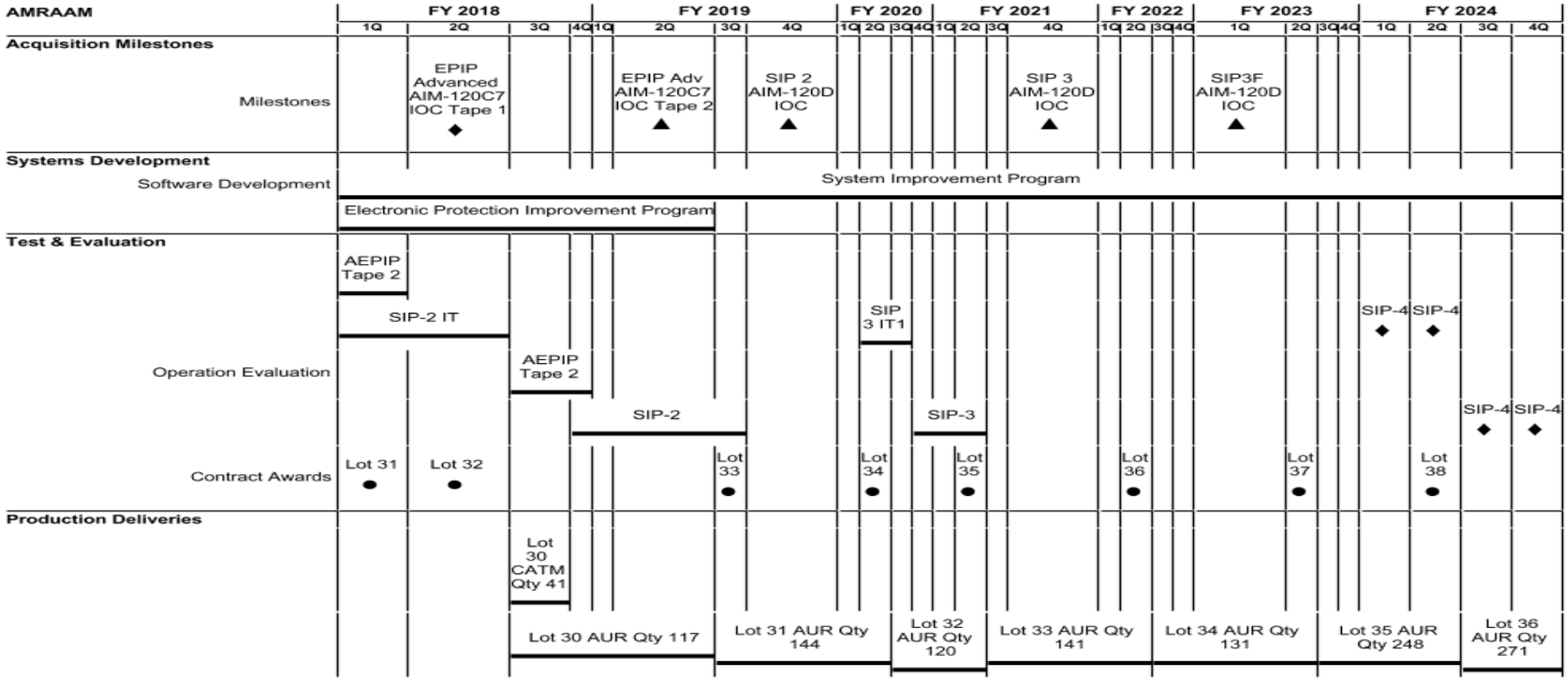
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	PMA-259 : Patuxent River, MD	0.000	0.424	Mar 2018	0.432	Mar 2019	0.440	Mar 2020	-		0.440	1.674	2.970	2.970
Travel	MIPR	PMA-259 : Eglin AFB FL	3.400	0.068	Oct 2017	0.066	Oct 2018	0.065	Oct 2019	-		0.065	0.521	4.120	-
Prior Years Mgmt Costs no longer funded in the FYDP	Various	Various : Various	4.002	0.000		0.000		0.000		-		0.000	0.000	4.002	-
		Subtotal	7.402	0.492		0.498		0.505		-		0.505	2.195	11.092	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	193.264	29.486		28.235		39.029		-		39.029	223.840	513.854	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207163N / *AMRAAM*	**Project (Number/Name)** 0981 / *AMRAAM*



2020DON - 0207163N - 0981

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207163N / *AMRAAM*	**Project (Number/Name)** 0981 / *AMRAAM*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
AMRAAM				
Acquisition Milestones: Milestones: EPIP Advanced AIM-120C7 IOC Tape 1	2	2018	2	2018
Acquisition Milestones: Milestones: SIP 2 AIM-120D IOC	4	2019	4	2019
Acquisition Milestones: Milestones: SIP 3 AIM-120D IOC	4	2021	4	2021
Acquisition Milestones: Milestones: SIP3F AIM-120D IOC	1	2023	1	2023
Acquisition Milestones: Milestones: EPIP Advanced AIM-120C7 IOC Tape 2	2	2019	2	2019
Systems Development: Software Development: System Improvement Program	1	2018	4	2024
Systems Development: Software Development: Electronic Protection Improvement Program	1	2018	2	2019
Test & Evaluation: AEPIP Tape 2 IT-4/5	1	2018	1	2018
Test & Evaluation: SIP-2 IT-1/2/3	1	2018	2	2018
Test & Evaluation: SIP 3 IT1-3	2	2020	3	2020
Test & Evaluation: SIP-4 IT-1	1	2024	1	2024
Test & Evaluation: SIP-4 IT-2/3	2	2024	2	2024
Test & Evaluation: Operation Evaluation: AEPIP Tape 2 OT-4/5/6	3	2018	4	2018
Test & Evaluation: Operation Evaluation: SIP-2 OT-1/2/3/4	4	2018	3	2019
Test & Evaluation: Operation Evaluation: SIP3 OT1-4	4	2020	2	2021
Test & Evaluation: Operation Evaluation: SIP-4 OT-1	3	2024	3	2024
Test & Evaluation: Operation Evaluation: Sip-4 OT-2/3	4	2024	4	2024
Test & Evaluation: Contract Awards: Production Lot 31 Contract Award	1	2018	1	2018
Test & Evaluation: Contract Awards: Production Lot 32 Contract Award	2	2018	2	2018
Test & Evaluation: Contract Awards: Production Lot 33 Contract Award	3	2019	3	2019
Test & Evaluation: Contract Awards: Production Lot 34 Contract Award	2	2020	2	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0207163N / *AMRAAM*	**Project (Number/Name)** 0981 / *AMRAAM*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Test & Evaluation: Contract Awards: Production Lot 35 Contract Award	2	2021	2	2021
Test & Evaluation: Contract Awards: Production Lot 36 Contract Award	2	2022	2	2022
Test & Evaluation: Contract Awards: Production Lot 37 Contract Award	2	2023	2	2023
Test & Evaluation: Contract Awards: Production Lot 38 Contract Award	2	2024	2	2024
Production Deliveries: Production Lot 30 CATM Qty 41	3	2018	3	2018
Production Deliveries: Production Lot 30 AUR Qty 117	3	2018	2	2019
Production Deliveries: Production Lot 31 AUR Qty 144	3	2019	2	2020
Production Deliveries: Production Lot 32 AUR Qty 120	3	2020	2	2021
Production Deliveries: Production Lot 33 AUR Qty 141	3	2021	2	2022
Production Deliveries: Production Lot 34 AUR Qty 131	3	2022	2	2023
Production Deliveries: Production Lot 35 AUR Qty 248	3	2023	2	2024
Production Deliveries: Production Lot 36 AUR Qty 271	3	2024	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0303109N *I Satellite Communications (Space)*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	0.000	34.344	-	34.344	20.250	27.164	7.000	6.000	Continuing	Continuing
0728: *EHF SATCOM Terminals*	0.000	0.000	0.000	34.344	-	34.344	20.250	27.164	7.000	6.000	Continuing	Continuing
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 290												

Note

Navy Multiband Terminal (NMT) Program (Proj 0728) has been realigned from PE 1203109N to PE 0303109N starting in FY20.
Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT) Project has been realigned from OPN LI 3107 SUBMARINE BROADCAST SUPPORT to PE 0303109N starting in FY20.

A. Mission Description and Budget Item Justification

The Navy Multiband Terminal (NMT) Program is the required Navy component to the Advanced Extremely High Frequency (AEHF) program for enhancing protected and survivable satellite communications to Naval forces. The NMT system provides an increase in single service capability from 1.5 Megabits per second (Mbps) to 8 Mbps, increases the number of coverage areas and retains Anti-Jam/Low Probability of Intercept (AJ/LPI) protection characteristics. It is compatible with legacy Navy Low Data Rate/Medium Data Rate (LDR/MDR) terminals and will sustain the Military Satellite Communications (MILSATCOM) architecture by providing connectivity across the spectrum of mission areas, to include land, air and naval warfare, special operations, strategic nuclear operations, strategic defense, theater missile defense, and space operations and intelligence in support of Resilient Command and Control (RC2) initiatives. The NMT system replenishes and improves on Navy terminal capabilities of the Military Strategic, Tactical & Relay System (MILSTAR), Defense Satellite Communications System (DSCS), Wideband Global Satellite (WGS) and Global Broadcast Service (GBS). The new system equips the warfighters with the assured, jam resistant, secure communications as described in the joint AEHF satellite communications system and WGS Operational Requirements Documents (ORD).

The Mobile AEHF Terminal (MAT) is the Navy's solution to provide key communications using the AEHF satellite constellation to support the Take Charge and Move Out (TACAMO) Ground Communication mobile mission, while also meeting mobility, size and weight requirements. The NMT provides multiband Satellite Communications (SATCOM) capability for ship, submarine, and protected MILSATCOM for shore sites.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0303109N *I Satellite Communications (Space)*		
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	34.344	-	34.344
Total Adjustments	0.000	0.000	34.344	-	34.344
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	34.344	-	34.344

Change Summary Explanation

The FY20 funding request was reduced by $1.731M (Proj 0728) to account for the availability of prior year balances.

The NMT (PROJECT 0728) FY20 increase awards the contract funding Navy specific development of the Wideband Anti-Jam Modem Systems (WAMS) to include the Direct Sequence Spread Spectrum (DSSS) Waveform and Network Operations Without Shore (NOWS). The FY20 NMT increase is $4.465M.

The FY20 $12M increase is for NMT MAT Project due to complexity of requirements to develop a new terminal versus a replacement solution.

Schedule:
EHF SATCOM Terminals (Project 0728) - No change

Technical:
EHF SATCOM Terminals (Project 0728): No change

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0303109N / *Satellite Communications (Space)*				Project (Number/Name) 0728 / *EHF SATCOM Terminals*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
0728: *EHF SATCOM Terminals*	0.000	0.000	0.000	34.344	-	34.344	20.250	27.164	7.000	6.000	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
Project MDAP/MAIS Code: 290												

Note

Navy Multiband Terminal (NMT) Program (Proj 0728) has been realigned from PE 1203109N to PE 0303109N starting in FY20.
Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT) Project has been realigned from PE 0101402N to PE 0303109N starting in FY20.

A. Mission Description and Budget Item Justification

The Navy Multiband Terminal (NMT) Program is the required Navy component to the Advanced Extremely High Frequency (AEHF) Program for enhancing protected and survivable satellite communications to Naval forces. Although development of the NMT terminal is complete, software and hardware upgrade development is ongoing to provide enhanced capabilities to the fleet. The NMT system provides an increase in single service capability from 1.5 Megabits per second (Mbps) to 8 Mbps, increases the number of coverage areas, and retains Anti-Jam/Low Probability of Intercept (AJ/LPI) protection characteristics. It is compatible with legacy Navy Low Data Rate/Medium Data Rate (LDR/MDR) terminals and will sustain the Military Satellite Communications (MILSATCOM) architecture by providing connectivity across the spectrum of mission areas, to include land, air and naval warfare, special operations, strategic defense, theater missile defense, and space operations and intelligence. The NMT system replenishes and improves on Navy Military Strategic, Tactical & Relay System (MILSTAR), Defense Satellite Communications System (DSCS), Wideband Global Satellite (WGS), and Global Broadcast Service (GBS) terminal capabilities. The new system equips the warfighters with assured, jam resistant, secure communications as described in both the joint AEHF Satellite Communications System and the WGS Operational Requirement Documents (ORD). Mission requirements specific to Navy operations, including threat levels and scenarios, are contained in the ORD. The NMT provides multiband Satellite Communications (SATCOM) capability for ship, submarine, and protected MILSATCOM for shore sites.

The Wideband Anti-Jam Modem System (WAMS) is a Navy technology upgrade that enhances communication capability of shipboard and submarine NMTs by providing wideband Anti-Jam (AJ) Satellite Communication throughput over Wideband Global SATCOM (WGS). WAMS is a major contributor in supporting the National Defense Strategy by investing in resilience to provide assured communications capabilities. WAMS enables space segment Anti Jam (AJ) diversity (EHF/AEHF and WGS), thus enabling NMT ships and submarines equipped with the modem to operate in wideband links closer to threat jammers. The United States USAF (USAF) Protected Tactical Enterprise Service (PTES) program will provide the ground hub component of the WAMS communication system. This PTES joint hub will serve as a DoD enterprise service ground solution for the use of the Protected Tactical Waveform (PTW) of SATCOM communications and introduces a Network Operations Without Shore (NOWS) capability. The NOWS capability will use the Direct Sequence Spread Spectrum (DSSS) waveform that provides uninterrupted communication in case of loss of shore hub connectivity. PTW is a Frequency Hopped Spread Spectrum (FHSS) waveform that provides high data rates in a benign environment and anti-jam protection to meet contested data rate requirements. High data rate anti-jam capability is enabled via the Protected Tactical Waveform (PTW) and low data rate anti-jam capability is provided via the Direct Sequence Spread Spectrum (DSSS) waveform. These two waveforms are designed to operate over the Wideband Global SATCOM system as well as other transponded satellites, and are also forward compatible with the on-board processing capabilities of the future Protected Tactical Satellites (PTS). WAMS enables the use of WGS X and Ka-band resources to assure access to mission critical communications to provide Resilient Command and

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303109N / *Satellite Communications (Space)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

Control (RC2) capabilities in contested/degraded environments, formerly known as Anti-Access/Area Denial (A2AD). The use of WAMS PTW on WGS will augment AEHF Extended Data Rate (XDR) services to provide the information throughput capacity necessary to support critical Command and Control capability.

Development efforts, including Adaptive Coding, Time of Day, and the Wideband Anti-Jam Modem System (WAMS) augment the baseline NMT system to pace the evolving threats to the warfighter. The Time of Day (TOD) capability promotes communications reliability and resiliency; when the channel is degraded due to inclement weather or adversarial action. TOD enables the system to automatically transition to a more robust, lower code rate resulting in ability to maintain satellite link thereby allowing the fleet to preserve communications.

The Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT) is the Navy's solution to provide key communications using the AEHF satellite constellation to support the Take Charge and Move Out (TACAMO) Ground Communication mobile mission, while also meeting mobility, size and weight requirements. The FY20 request will provide for planning and design efforts to include requirements definition and refinement, cost estimates, Integrated Master Schedule (IMS) development and maintenance, analysis of alternatives, and acquisition approach development for the potential follow-on effort. The project requires technical and trade studies including technical feasibility studies, security studies, link budget study, High altitude Electro Magnetic Pulse (HEMP) study, existing terminal studies, Baseband studies, future compatibility studies, and logistics commonality studies.

The FY20 request will provide for the award of a full and open competitive contract for the design and development Wideband Anti Jam Modem System (WAMS) to include the Navy unique requirements and to design and implement the changes required to the technical baseline to support the integration of WAMS with the NMT. The FY20 request will also provide for MAT planning, design efforts, cost estimates, Integrated Master Schedule (IMS) development and maintenance, analysis of alternatives, and acquisition approach development for the potential follow-on effort.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: NMT Resilient C2 Development	0.000	0.000	22.194	0.000	22.194
Articles:	-	-	-	-	-
Description: Software and hardware upgrade development is ongoing to provide Resilient Command and Control (RC2) capabilities to pace the evolving threats to the warfighter in contested/degraded environments. The Wideband Anti-Jam Modem System (WAMS) will provide an anti-jamming capability that will counter various adversary threats. Adaptive Coding (AC) will autonomously maximize throughput in degraded or benign conditions over the Advanced Extremely High Frequency (AEHF) satellites, providing significantly more throughput than is available today in the baseline NMT. The Time of Day (TOD) capability promotes communications reliability and resiliency; when the channel is degraded due to inclimate weather or adversarial action. TOD enables the system to automatically transition to a more robust, lower code rate resulting in ability to maintain satellite link thereby allowing the fleet to preserve communications. Technology Insertion, studies and implementation is necessary for military satellite communications systems development to support emerging technologies.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303109N / *Satellite Communications (Space)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: FY19 Plans for NMT funded under PE 1203109N, Project 0728. ***FY 2020 Base Plans:*** Award a full and open competitive contract for the design and development of the Navy Wideband Anti Jam Modem System (WAMS) configuration. The contract will include Navy unique requirements such as antenna handover that provides the means to shift communications from one antenna to another to avoid shipboard super structure blockage. This will also include the Direct Sequence Spread Spectrum (DSSS) waveform that provides uninterrupted communication in case of loss of shore hub connectivity as well as interface to the Automatic Digital Network System (ADNS), and shipboard and submarine environmental qualification testing. The vendor will design and implement the changes required to the technical baseline to support the integration of WAMS with the NMT. The vendor will conduct a System Requirements Review (SRR), System Design Review (SDR) and a Preliminary Design Review (PDR) of the WAMS to work with both the Protected Tactical Waveform (PTW) and the Direct Sequence Spread Spectrum (DSSS) waveform to enable anti-jam communications and Network Operations Without Shore (NOWS). This will include development of the Embedded Crypto Unit (ECU) that provides protection for both waveforms. The ECU development as part of the contract will require National Security Agency (NSA) coordination and certification. NSA certification will require full engineering support to evaluate the security posture of the vendor's implementation of the ECU into the Wideband Anti Jam Modem System (WAMS). MIT Lincoln Labs will support the requirement to meet the gold standard for WAMS development to be interoperable with the Protected Tactical Enterprise Service (PTES) Hub. Continue ADNS development of the dynamic network interface that enables data rate to change based on modem link condition and will be included in the Automatic Digital Network System (ADNS) Service Pack 5 software build. Start to develop all required training documentation and required Shipmain documentation to install the Engineering Design Model (EDM) modems on identified surface, subsurface and shore facilities to support a Multiservice Operational Test & Evaluation (MOT&E) event in FY22. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303109N / *Satellite Communications (Space)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase of $4.465M from FY19 to FY20 is to support WAMS development efforts for the Direct Sequence Spread Spectrum (DSSS) waveform and the Networked Operations without Shore (NOWS) Waveform.					
Title: Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT)	0.000	0.000	12.000	0.000	12.000
Articles:	-	-	-	-	-
Description: The Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT) is the Navy's solution to provide key communications using the AEHF satellite constellation to support the Take Charge and Move Out (TACAMO) Ground Communication mobile mission, while also meeting mobility, size and weight requirements. The MAT project will be the Navy's solution to provide key communications using the AEHF satellite constellation, while also meeting mobility, size and weight requirements.					
FY 2019 Plans: FY19 Plans for Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT) was funded under PE 0101402N, Project 1083.					
FY 2020 Base Plans: Continue technical and trade studies for MAT to include technical feasibility studies, security studies, and link budget study. Additional studies include: High altitude Electro Magnetic Pulse (HEMP) study, existing terminal studies, Baseband studies, future compatibility studies, and logistics commonality studies. Technical feasibility study to evaluate available technical alternatives. The project will study existing terminals to evaluate the efficacy of using Government Off-The-Shelf (GOTS) equipment. The baseband study will ensure proper definition of interfaces and interrelations with other systems (e.g., Mission Planning Element (MPE)). Future compatibility study will be conducted to accommodate potential future systems (e.g., Evolved Strategic Satellite (ESS)) and to inform system technical specifications. Develop technical and pre-award acquisition documentation for the MAT effort to include RFP development and coordination as well as technical specifications. Documentation development includes the MAT Specification, Cyber strategy to support the Clinger Cohen Act and Information Support Plan (ISP). Initiate certification and coordination process through NSA.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: FY19 to FY20 increase represents a PE realignment from 1203109N to 0303109N beginning in FY20. In FY19 MAT project funding in the amount of $5M was provided under PE 0101402N Project 1083. FY20 MAT funding					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303109N / *Satellite Communications (Space)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
reflects a full year of studies and design beyond the initial planning and commencement of studies in FY19. The complexity of requirements has increased and MAT will require significant development and integration activities.					
Title: Technology Insertion ***Articles:*** ***Description:*** Overall program efforts include technology insertion implementation and associated testing required to support satellite communications. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** To maintain alignment with the Navy's Resilient Command and Control (RC2) strategy and approach, Commercial Broadband Satellite Program (CBSP) will transition from exercising an initial RC2 modem capability to utilizing the Wideband Anti-Jam Modem System (WAMS), which provides protected wideband Satellite Communication (SATCOM) capability to the Fleet. Funds are required to test and integrate the WAMS into the CBSP architecture. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase of $0.150M from FY19 to FY20 is to support enhancements required for RC2 and WAMS capabilities required to pace the evolving threats to the warfighter in contested/degraded environments.	0.000 -	0.000 -	0.150 -	0.000 -	0.150 -
Accomplishments/Planned Programs Subtotals	0.000	0.000	34.344	0.000	34.344

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3216: *NAVY MULTIBAND TERMINAL (NMT)*	62.113	109.385	88.021	-	88.021	70.187	24.249	16.585	20.281	73.062	1,551.433
• RDTEN/1203109N/0728: *EHF SATCOM Terminals*	21.830	17.729	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	39.559

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303109N / *Satellite Communications (Space)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

Funding for Prior Year through FY19 NMT OPN in PE 1203109N.

The Other Appropriation represents remaining procurement and installation of NMT production units for Afloat and Shore requirements to reach Full Operational Capability. Funding also includes the procurement and installation of Assured Command and Control (AC2) modems as well as the installation of Advanced Time Division Multiple Access (TDMA) Interface Processors (ATIPs), X/KA Back-Fits, and Ashore Antennas.

D. Acquisition Strategy

The Navy Multiband Terminal (NMT) Follow-On Full Deployment (FOFD) contract will continue NMT production for Afloat platforms and Shore locations, in support of the Chief of Naval Operations and the Department of the Navy (DON), and will allow the NMT Program to complete Full Operational Capability (FOC) . The competitive contract awarded to Comtech supports the development of Advanced Time Division Multiple Access (TDMA) Interface Processor (ATIP) and Assured Command and Control (AC2) modem enhancements such as Adaptive Coding. A new competitive contract will be awarded to support development and procurement of the Wideband Anti-Jam Modem System (WAMS).

The MAT initial acquisition strategy was based on a replacement solution for the current Single Channel Anti-Jam Man Portable (SCAMP) terminal, that would leverage the existing capabilities, designs, hardware, software, Mission Planning and testing from the Air Force's Family of Advanced Beyond Line-Of-Sight Terminal (FAB-T) Command Post Terminal (CPT) program, rather than developing a new terminal. From initial conception to today, the complexity of requirements has increased. It is now evident that MAT will require significant development and integration activities in order to make the acquisition successful. The RDT&E is needed as result of the complexity and increased requirements to develop a solution. Additionally, the funding is being realigned to PMW/A 170 as that program office has the cadre of acquisition and AEHF engineering expertise already on staff so is better situated to manage the MAT effort.

E. Performance Metrics

The RDT&E goal for the NMT program is to create a military satellite communications system that consolidates capabilities of current and future satellite systems into a single terminal, and develops terminal communications capabilities that will counter all current and projected threats to satellite operations enabling communications in all environments.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0303109N / *Satellite Communications (Space)*	Project (Number/Name) 0728 / *EHF SATCOM Terminals*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development Engineering	C/CPFF	NUWC : Newport, RI	0.000	0.000		0.000		3.067	Jan 2020	-		3.067	Continuing	Continuing	Continuing
Software Development Engineering	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.515	Jan 2020	-		0.515	Continuing	Continuing	Continuing
WAMS Design Development	C/CPIF	TBD : TBD	0.000	0.000		0.000		9.720	Feb 2020	-		9.720	Continuing	Continuing	Continuing
MAT Studies and Design Development	MIPR	MIT/LL : Lexington, MA	0.000	0.000		0.000		6.700	Feb 2020	-		6.700	0.000	6.700	-
		Subtotal	0.000	0.000		0.000		20.002		-		20.002	Continuing	Continuing	N/A

Remarks

FY20 increase will award a new contract to fund the development of the Wideband Anti-Jam Modem System (WAMS) to include the Direct Sequence Spread Spectrum (DSSS) waveform and Network Operations Without Shore (NOWS) capability in support of critical Resilient Command and Control (RC2) capability. The FY20 increase also provides for Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT) for studies and design development.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Integration/ Government Oversight	WR	NUWC : Newport, RI	0.000	0.000		0.000		1.394	Nov 2019	-		1.394	Continuing	Continuing	Continuing
Software Integration Support	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.745	Nov 2019	-		0.745	Continuing	Continuing	Continuing
Software Engineering Support	C/CPFF	SYSTECH : San Diego, CA	0.000	0.000		0.000		2.163	Nov 2019	-		2.163	Continuing	Continuing	Continuing
WAMS Studies and Design	FFRDC	MIT/LL : Lexington, MA	0.000	0.000		0.000		0.500	Jan 2020	-		0.500	Continuing	Continuing	Continuing
WAMS Cybersecurity Engineering	WR	NSA : Fort Meade, MD	0.000	0.000		0.000		0.275	Jan 2020	-		0.275	Continuing	Continuing	Continuing
MAT Studies and Design	WR	NUWC : Newport, RI	0.000	0.000		0.000		1.600	Feb 2020	-		1.600	0.000	1.600	-
MAT Cybersecurity Engineering Support	C/BA	SYSTECH : San Diego, CA	0.000	0.000		0.000		0.800	Oct 2019	-		0.800	0.000	0.800	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303109N / *Satellite Communications (Space)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MAT Cybersecurity Engineering	FFRDC	NSA : Fort Meade, CA	0.000	0.000		0.000		0.600	Dec 2019	-		0.600	0.000	0.600	-
MAT Engineering Support	C/CPFF	NUWC : Newport, RI	0.000	0.000		0.000		1.500	Dec 2019	-		1.500	0.000	1.500	-
		Subtotal	0.000	0.000		0.000		9.577		-		9.577	Continuing	Continuing	N/A

Remarks

The FY20 increase provides for Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT) for studies and design support.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Insertion	WR	COTF : Norfolk, VA	0.000	0.000		0.000		0.150	Jan 2020	-		0.150	0.000	0.150	-
WAMS Development Test and Evaluation	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		2.265	Nov 2019	-		2.265	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		2.415		-		2.415	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Management	C/CPFF	BAH : San Diego, CA	0.000	0.000		0.000		0.200	Nov 2019	-		0.200	Continuing	Continuing	Continuing
Program Management	C/CPFF	BAH : San Diego, CA	0.000	0.000		0.000		1.300	Nov 2019	-		1.300	Continuing	Continuing	Continuing
Travel	Various	SPAWAR : Various	0.000	0.000		0.000		0.050	Nov 2019	-		0.050	Continuing	Continuing	Continuing
MAT Contracts Management	C/CPFF	BAH : San Diego, CA	0.000	0.000		0.000		0.800	Nov 2019	-		0.800	0.000	0.800	-
		Subtotal	0.000	0.000		0.000		2.350		-		2.350	Continuing	Continuing	N/A

Remarks

The FY20 increase provides for Mobile Advanced Extremely High Frequency (AEHF) Terminal (MAT) management services.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0303109N / *Satellite Communications (Space)*	Project (Number/Name) 0728 / *EHF SATCOM Terminals*	

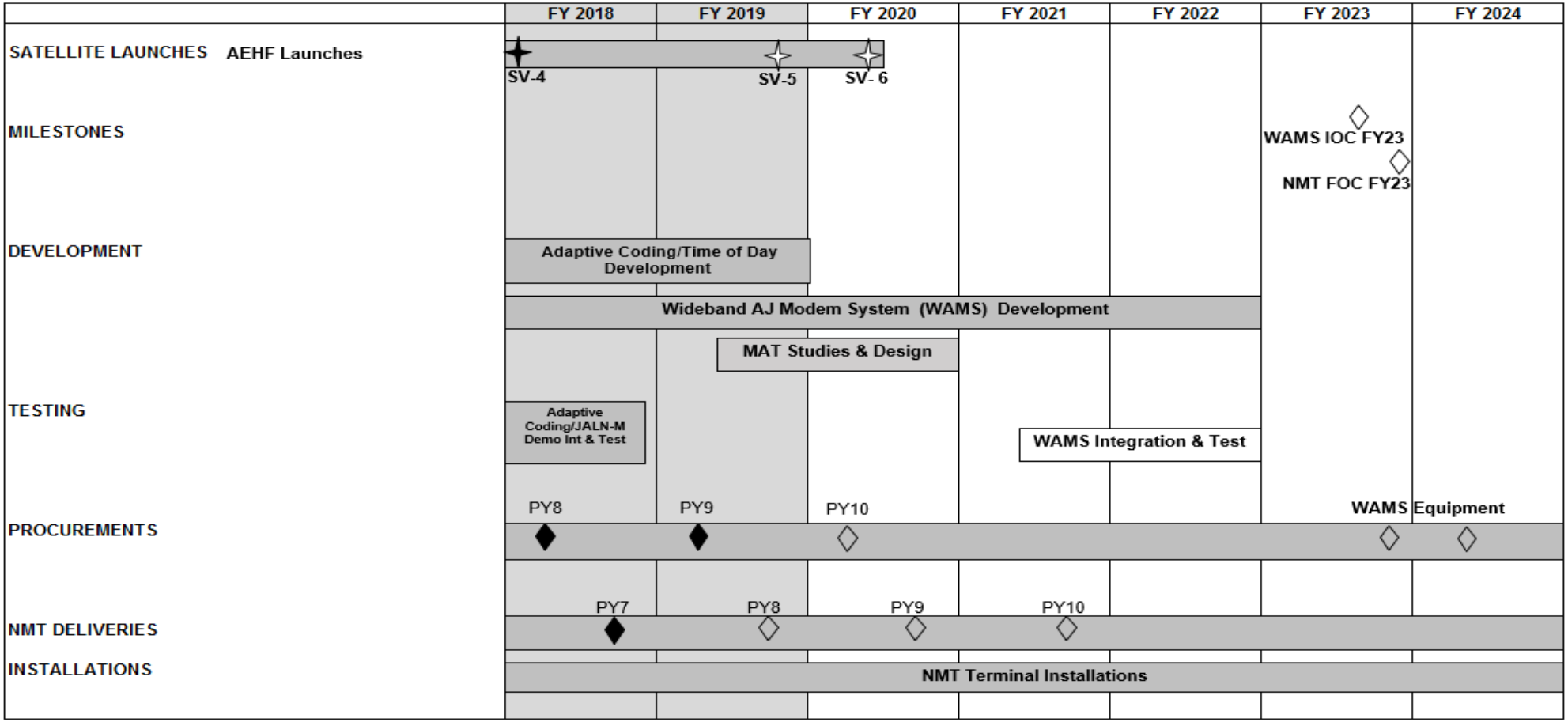
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		34.344		-		34.344	Continuing	Continuing	N/A

Remarks

FY19 and Prior NMT cost data is provided under PE 1203109N, Project 0728.

FY19 MAT cost data is provided under PE 0101402N, Project 1083.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303109N / *Satellite Communications (Space)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*



Notes:
FY18-19 NMT funding is provided under PE 1203109N Project 0728.
FY19 MAT funding was provided under PE 0101402N, Project 1083.

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303109N / *Satellite Communications (Space)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0728				
AEHF Launch SV-6	2	2020	2	2020
NMT Procurement Year (PY10)	2	2020	2	2020
NMT FRP PY9 Delivery	3	2020	3	2020
NMT FRP PY10 Delivery	3	2021	3	2021
WAM Integration & Testing	2	2021	4	2022
WAMS IOC	3	2023	3	2023
NMT FOC	4	2023	4	2023
FY23 WAMS Procurement	4	2023	4	2023
FY24 WAMS Procurement	2	2024	2	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0303138N *I Consolidated Afloat Network Ent Services(CANES)*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	202.863	24.197	23.697	22.873	-	22.873	23.333	23.902	24.374	24.853	Continuing	Continuing
0725: *Communication Automation*	0.000	0.000	0.000	0.821	-	0.821	0.876	0.894	0.912	0.930	Continuing	Continuing
9C87: *CANES Integration*	202.863	24.197	23.697	22.052	-	22.052	22.457	23.008	23.462	23.923	277.470	643.129
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** M417												

Note

To ensure resources are aligned to enable rapid capability delivery, funding has been realigned into PE 0303138N from the following Program Element/Project as part of RDTEN PE Consolidation starting in FY20: PE 0204163N Project 0725 (Communication Automation, Automated Digital Network System (ADNS)). There are no New Starts associated with PE Consolidation

A. Mission Description and Budget Item Justification

Consolidated Afloat Networks and Enterprise Services (CANES) is the Navy's Program of Record (POR) to replace and modernize existing afloat networks with the necessary hardware, software and enterprise services infrastructure to enable information warfare from and within the tactical domain. CANES provides complete infrastructure inclusive of hardware, software, processing, storage and end user devices for the Unclassified, Coalition, Secret and Sensitive Compartmented Information (SCI) enclaves to a wide variety of Navy surface combatants, submarines and Maritime Operations Centers. CANES services include application hosting, data transport and storage, system management, cyber security, email, web, chat, collaboration, and voice and video services. CANES is based on the overarching concept of reducing the number of afloat networks and providing enhanced efficiency through a single engineering focus on integrated technical solutions. It allows for streamlined acquisition, contracting, test events, sustainment, and significant lifecycle efficiencies through consolidation of multiple configuration management baselines, logistics, and training efforts into a single unified support structure.

More than eighty (80) hosted applications and systems inclusive of Command and Control, Intelligence, Surveillance and Reconnaissance, Information Operations, Logistics and Business domains require the CANES infrastructure to operate in the tactical environment. Specific programs, such as Distributed Common Ground System - Navy (DCGS-N), Global Command and Control System - Maritime (GCCS-M), Naval Tactical Command Support System (NTCSS), and Undersea Warfare Decision Support System (USW-DSS), no longer provide their own independent network hardware and now depend on CANES to field, host, and sustain their capabilities. The CANES Application Integration program provides common software governance, testing, processes, and tools to application developers, and evaluates and confirms compatibility between CANES and the hosted applications prior to fielding. CANES also provides a set of capabilities called Agile Core Services (ACS) which brings common network services to allow hosted application developers to focus on the unique capabilities they provide.

CANES is funded and programmed to develop regular technical updates with an agile and robust hardware and software baseline development cycle necessary to pace rapidly evolving cyber security threats and meet emerging operational demands within the tactical domain. In order to deliver a mission effective, secure and affordable

afloat network, CANES implements a Development Operations (DevOps) framework to improve its engineering processes and speed the deployment of new cyber security, application hosting and baseline updates. CANES requires that Automated Digital Network System (ADNS) field prior to or concurrently with CANES due to the architectural reliance between the two programs.

In FY 2020, CANES will start development of Technical Insertion (TI) 4 hardware and software baseline development including ACS, E2C laboratory engineering efforts and implementation of a Development Operations development and testing environment. Perform Operational Testing in support of CANES submarine variant and perform Application Integration System Integration Testing to support TI 3 software development efforts.

Automated Digital Network System (ADNS) is the method by which Tactical Navy units transfer Internet Protocol (IP) data to Navy and Department of Defense communities on the Global Information Grid (GIG). ADNS is the gateway to tactical Wide Area Network (WAN) afloat for Internet Protocol network operations, supporting information dissemination and external connectivity. ADNS enables services and applications to interconnect to the Defense Information Systems Network (DISN) ashore via multiple Radio Frequency (RF) resources, to include emerging Assured Command and Control (C2) capabilities and pier connectivity.

In FY 2020, Automated Digital Network System (ADNS) will perform technical analyses and engineering efforts associated with the implementation of new technology to enable rapid introduction of new products and technology, prevent obsolescence, and mitigate end of support issues.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	24.271	23.697	22.173	-	22.173
Current President's Budget	24.197	23.697	22.873	-	22.873
Total Adjustments	-0.074	0.000	0.700	-	0.700
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.283	0.000			
• SBIR/STTR Transfer	-0.357	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.700	-	0.700

Change Summary Explanation

Project 0725, Communication Automation: $0.821M was realigned from PE 0204163N to PE 0303138N as a result of budget line item consolidation. There is no significant change in this project's budget request from FY19 to FY20.

Project 9C87, CANES Integration: Funding decreased from FY19 to FY20 due to one-time development efficiencies gained in consolidating design efforts into fewer functional baselines.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	Project (Number/Name) 0725 / *Communication Automation*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0725: *Communication Automation*	0.000	0.000	0.000	0.821	-	0.821	0.876	0.894	0.912	0.930	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Funding has been realigned into PE 0303138N from PE 0204163N Project 0725 as part of RDTEN PE Consolidation starting in FY20. There are no New Starts associated with this realignment. All budgeted efforts have been previously approved.

A. Mission Description and Budget Item Justification

Automated Digital Network System (ADNS) provides routing, switching, baseband, configuration and monitoring capabilities for interconnecting naval, coalition and joint enclaves worldwide. ADNS utilizes off the shelf equipment and network protocols as specified by the Joint Technical Architecture. ADNS INC III combines all Navy Tactical Voice, Secure Communications Interoperability Protocol (SCIP) Inter-Working Function, video, and data requirements into a converged IP data stream. ADNS INC III supports higher bandwidth satellites, providing up to 25 megabytes per second (Mbps) of throughput on Unit Level ships and up to 50 Mbps on Force Level ships. INC III architecture also incorporates an IPv4/IPv6 dual stack and Cipher-Text (CT) security architecture to align to the Global Information Grid (GIG) in order to mesh Navy Tactical surface, subsurface, airborne platforms, and Aegis Ashore sites into single IP environments with gateway functions to coalition and joint networks, in addition to greater security utilizing the High Assurance Internet Protocol Encryptor (HAIPE) devices. ADNS will serve as the Navy tactical interface for IP Networking for not only the JALN-M system but also the key Assured Command and Control (C2) capabilities. ADNS will investigate emerging technologies to integrate with additional Department of Defense C4I Programs to improve inter-strike group networking and extend the network to the tactical edge.

FY20 ADNS RDT&E investment will continue to support Interface Design Development (IDD) and integration with network applications, development of Line-Of-Sight (LOS) link, DISN integration, and development of CT piers. ADNS development will include addressing network management, intra and inter domain routing, Quality of Service (QoS), and Concept of Operations discussions. Will continue Network-Based Cyber Security technology and virtualization to increase performance of the Navy's ADNS routing and transport architecture.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Automated Digital Network System (ADNS)	0.000	0.000	0.821	0.000	0.821
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 Plans funded under PE 0204163N, Project 0725.					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 0725 / *Communication Automation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue testing and interfacing with ENMS, IPv6 transition, and integration of SHF. Continue the IDD and integration with network applications, develop LOS link, DISN integration and development of CT piers. Investigate and recommend platform network devices, network design support to include procurement, integration and testing of the WAN. Continue network-based Cyber Security technology and virtualization of ADNS. Perform technical analyses and engineering efforts associated with implementation of new technology to enable rapid introduction of new products and technology, prevent obsolescence, and mitigate end of support issues. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** In FY19 funding under PE 0204163N, Project 0725 was $0.844M. Funding decreases by $0.023M to $0.821M in FY20. There is no significant change in this project's budget request from FY19 to FY20.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.821	0.000	0.821

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3050: *Ship Communications Automation*	99.545	105.087	137.861	-	137.861	122.421	94.494	96.577	92.889	Continuing	Continuing
• RDTEN/0204163N/0725: *Communication Automation*	8.465	1.344	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	249.332

Remarks

OPN/3050 funding profile captures more than ADNS OPN budget control. BLI 3050 funds C2OIX, STACC, ORT, EPCA, and ADNS programs.

RDTEN/0204163N/0725 funding profile captures more than ADNS RDTEN budget control. PU 0725 funds Battle Force Tactical Network (BFTN), Joint Aerial Layer Network - Maritime (JALN-M), and Automated Digital Network System (ADNS). Funding has been realigned into PE 0303138N from the following Program Elements/ Projects as part of RDTEN PE Consolidation starting in FY20: PE 0204163N Project 0725 Communication Automation.

D. Acquisition Strategy

Automated Digital Network System (ADNS): Evolutionary acquisition approach with overlapping development and implementation phases for defined INC I, II, and III baselines. INC I, II, and III will use competitively awarded contracts to implement changes consistent with acquisition initiatives. ADNS leverages Commercial-Off-The-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 0725 / *Communication Automation*

Shelf (COTS) and Government Off-the-Shelf (GOTS) products while capitalizing on acquisition reform initiatives to achieve material savings in the logistics, installation, integration and training areas. Where feasible, differing types of advantageous contract vehicles will be used to provide flexibility, decrease contract administrative costs, and encourage acquisition streamlining through the use of COTS/GOTS products.

E. Performance Metrics

ADNS - Included in the ADNS program goals are the improvements to bandwidth throughput, connectivity to multiple Radio Frequency (RF) paths, greater security, and system capability delivered within a smaller form factor. The ADNS program will, at a minimum, provide bandwidth throughput enhancements resulting in an increase from 2 megabytes per
second (Mbps) to 25/50 Mbps. ADNS will also provide the ability to transport data across multiple paths simultaneously vice the current limitations of single or secondary paths. ADNS will provide greater security posture by encrypting each enclave, increasing performance of the routing and transport architecture while reducing physical footprint and cost, and securing the core via Cipher-Text.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 0725 / *Communication Automation*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering-ADNS	WR	SSC : PAC/LANT	0.000	0.000		0.000		0.493	Dec 2019	-		0.493	Continuing	Continuing	Continuing
Systems Engineering-ADNS	WR	NUWC : Newport, RI	0.000	0.000		0.000		0.164	Oct 2019	-		0.164	Continuing	Continuing	Continuing
Systems Engineering-ADNS-DC	C/CPFF	NUWC : Newport, RI	0.000	0.000		0.000		0.041	Mar 2020	-		0.041	Continuing	Continuing	Continuing
Integration and Test-ADNS	C/CPFF	SSC : PAC	0.000	0.000		0.000		0.041	Mar 2020	-		0.041	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.739		-		0.739	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Certification Authority-ADNS	C/CPFF	BAH : San Diego, CA	0.000	0.000		0.000		0.082	Jan 2020	-		0.082	0.000	0.082	-
		Subtotal	0.000	0.000		0.000		0.082		-		0.082	0.000	0.082	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		0.821		-		0.821	Continuing	Continuing	N/A

Remarks

FY18 and FY19 cost data is provided under PE 0204163N Project 0725

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 0725 / *Communication Automation*

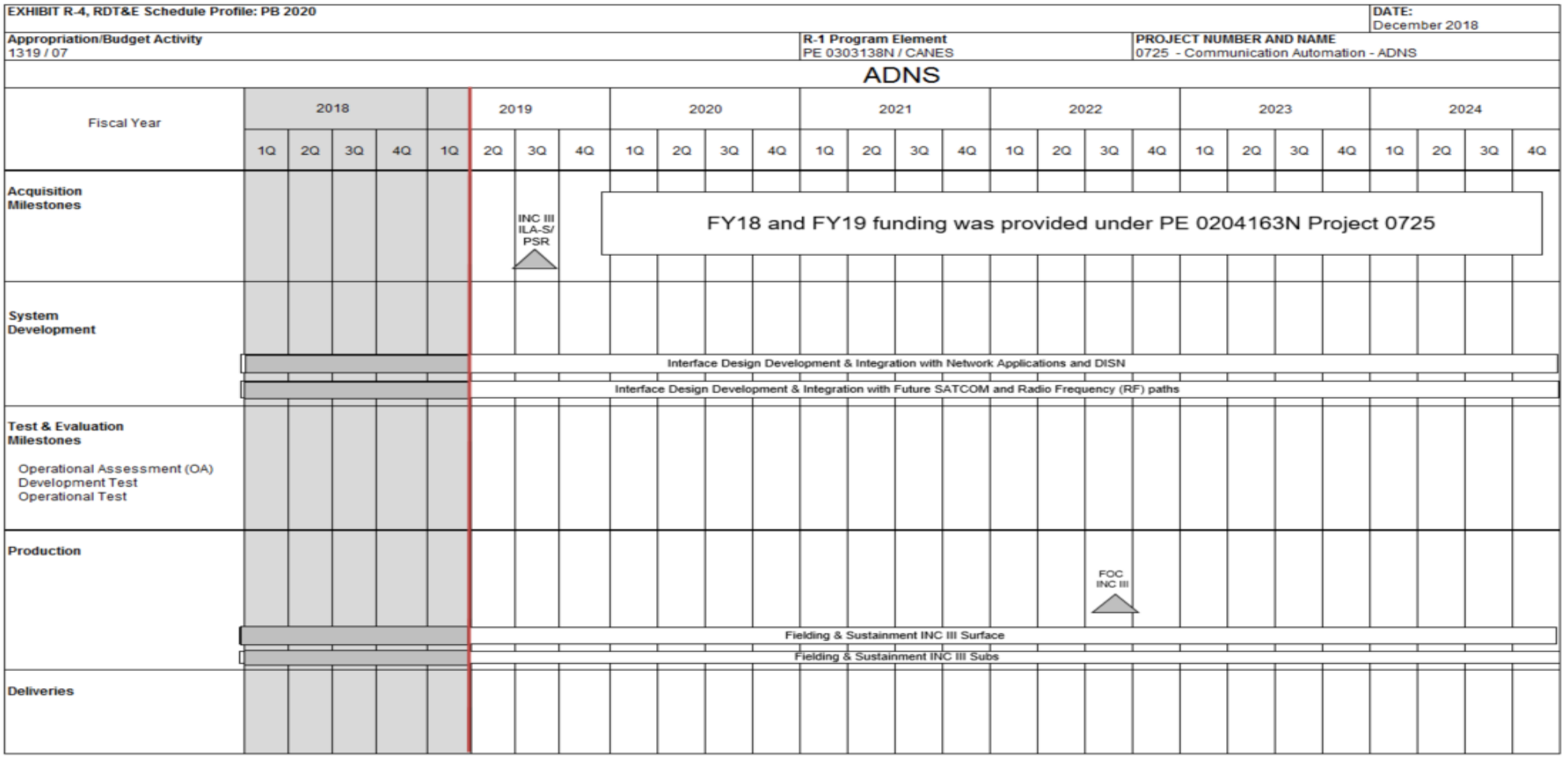


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 0725 / *Communication Automation*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0725				
System Development: ADNS: Increment III_Interface Design Development and Integration with Network Applications and Defense Information Systems Network (DISN)	1	2018	4	2024
System Development: ADNS: Increment III_Interface Design Development and Integration with SATCOM and Radio Frequency (RF) paths	1	2018	4	2024
Production: ADNS: Increment III_Fielding and Sustainment INC III Surface	1	2018	4	2024
Production: ADNS: Increment III_Fielding and Sustainment INC III Submarines	1	2018	4	2024
Production: ADNS: Increment III_Full Operational Capability	3	2022	3	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	Project (Number/Name) 9C87 / *CANES Integration*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9C87: *CANES Integration*	202.863	24.197	23.697	22.052	-	22.052	22.457	23.008	23.462	23.923	277.470	643.129
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: M417

A. Mission Description and Budget Item Justification

Consolidated Afloat Networks and Enterprise Services (CANES) is the Navy's Program of Record (POR) to replace and modernize existing afloat networks with the necessary hardware, software and enterprise services infrastructure to enable information warfare from and within the tactical domain. CANES provides complete infrastructure inclusive of hardware, software, processing, storage and end user devices for the Unclassified, Coalition, Secret and Sensitive Compartmented Information (SCI) enclaves to a wide variety of Navy surface combatants, submarines and Maritime Operations Centers. CANES services include application hosting, data transport and storage, system management, cyber security, email, web, chat, collaboration, and voice and video services. CANES is based on the overarching concept of reducing the number of afloat networks and providing enhanced efficiency through a single engineering focus on integrated technical solutions. It allows for streamlined acquisition, contracting, test events, sustainment, and significant lifecycle efficiencies through consolidation of multiple configuration management baselines, logistics, and training efforts into a single unified support structure.

More than eighty (80) hosted applications and systems inclusive of Command and Control, Intelligence, Surveillance and Reconnaissance, Information Operations, Logistics and Business domains require the CANES infrastructure to operate in the tactical environment. Specific programs, such as Distributed Common Ground System - Navy (DCGS-N), Global Command and Control System - Maritime (GCCS-M), Naval Tactical Command Support System (NTCSS), and Undersea Warfare Decision Support System (USW-DSS), no longer provide their own independent network hardware and now depend on CANES to field, host, and sustain their capabilities. The CANES Application Integration program provides common software governance, testing, processes, and tools to application developers, and evaluates and confirms compatibility between CANES and the hosted applications prior to fielding. CANES also provides a set of capabilities called Agile Core Services (ACS) which brings common network services to allow hosted application developers to focus on the unique capabilities they provide.

CANES is funded and programmed to develop regular technical updates with an agile and robust hardware and software baseline development cycle necessary to pace rapidly evolving cyber security threats and meet emerging operational demands within the tactical domain. In order to deliver a mission effective, secure and affordable afloat network, CANES implements a Development Operations (DevOps) framework to improve its engineering processes and speed the deployment of new cyber security, application hosting and baseline updates. CANES requires that Automated Digital Network System (ADNS) field prior to or concurrently with CANES due to the architectural reliance between the two programs.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: CANES Integration	24.197	23.697	22.052	0.000	22.052
Articles:	-	-	-	-	-
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 9C87 / *CANES Integration*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue development of Technical Insertion (TI) 3 software baseline development including Agile Core Services (ACS), Enterprise Engineering and Certification (E2C) laboratory engineering efforts and implementation of a Development Operations development and testing environment. Perform systems engineering efforts to complete functional baselines and update technical data packages in support of TI 3. Perform Development Testing in support of CANES submarine variant and perform Development Testing Assist (DTA) for TI 3 software development. ***FY 2020 Base Plans:*** Start development of Technical Insertion (TI) 4 hardware and software baseline development including ACS, E2C laboratory engineering efforts and implementation of a Development Operations development and testing environment. Perform Operational Testing in support of CANES submarine variant and perform Application Integration System Integration Testing to support TI 3 software development efforts. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding decrease from FY2019 to FY2020 is the result of one-time development efficiencies gained in consolidating design efforts into fewer functional baselines.					
Accomplishments/Planned Programs Subtotals	24.197	23.697	22.052	0.000	22.052

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2915: *CANES*	311.212	404.891	426.654	-	426.654	360.073	398.704	395.623	391.722	2,760.510	7,001.198
• OPN/2925: *CANES Intell*	46.075	53.465	52.713	-	52.713	45.763	50.833	48.161	49.151	449.385	1,114.576

Remarks

D. Acquisition Strategy

CANES is an ACAT IAC Major Automated Information System (MAIS) program. The program office employed a multiple-phase, multiple-award down-select contract strategy to reduce program risks and maintain competition in both design development and limited production during contract performance. Milestone C was achieved in 1QFY13 and Full Deployment Decision (FDD) was achieved in 1QFY16. In 2QFY15, a separate full and open indefinite delivery indefinite quantity (IDIQ) multiple award contract (MAC) production contract was awarded to support future production. CANES is programmed to develop regular technical updates to its hardware and software baselines to ensure that no cyber security vulnerabilities exist due to hardware and software obsolescence.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 9C87 / *CANES Integration*

E. Performance Metrics

Early RDT&E investment and sustainment of dual design contractors through the development phase reduced Total Ownership Cost (TOC) from Milestone B to Milestone C. Cost avoidance throughout the life of the program is based on 1) reducing the number of networks through the use of mature, certified, cross domain technologies; 2) reducing the infrastructure footprint and associated costs for hardware afloat; and 3) providing increased capability to meet current and projected war fighter requirements.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 9C87 / *CANES Integration*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Product Development	Various	Various : Various	179.731	0.000		0.000		0.000		-		0.000	0.000	179.731	179.731
Primary Hardware Development	WR	SSC : San Diego, CA and Charleston, SC	0.000	8.620	Nov 2017	8.646	Nov 2018	7.844	Nov 2019	-		7.844	63.100	88.210	100.000
Primary Software Development	WR	SSC : San Diego, CA and Charleston, SC	0.000	7.804	Nov 2017	9.721	Nov 2018	9.073	Nov 2019	-		9.073	70.944	97.542	110.000
Systems Engineering	C/CPFF	Booz Allen Hamilton (BAH) : San Diego, CA	0.000	0.315	Dec 2017	0.670	Dec 2018	0.627	Dec 2019	-		0.627	4.890	6.502	8.000
Systems Engineering	WR	SSC : San Diego, CA and Charleston, SC	0.000	4.481	Dec 2017	2.750	Dec 2018	2.573	Dec 2019	-		2.573	20.070	29.874	30.000
Systems Engineering	MIPR	US ARMY CECOM (MITRE) : San Diego, CA	0.000	0.827	Nov 2017	0.790	Mar 2019	0.776	Nov 2019	-		0.776	5.766	8.159	10.000
		Subtotal	179.731	22.047		22.577		20.893		-		20.893	164.770	410.018	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Support	Various	Various : Various	5.244	0.000		0.000		0.000		-		0.000	0.000	5.244	5.244
Studies & Design	WR	SSC : San Diego, CA	0.000	0.150	Nov 2017	0.460	Nov 2018	0.430	Nov 2019	-		0.430	3.357	4.397	5.000
Certification Authority	C/CPFF	NSMA : Washington, DC	0.000	0.377	Apr 2018	0.000		0.000		-		0.000	0.000	0.377	0.500
Certification Authority	C/CPFF	Booz Allen Hamilton (BAH) : San Diego,CA	0.000	0.863	Dec 2017	0.450	Dec 2018	0.421	Dec 2019	-		0.421	3.284	5.018	7.000
		Subtotal	5.244	1.390		0.910		0.851		-		0.851	6.641	15.036	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 9C87 / *CANES Integration*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Test & Evaluation	Various	Various : Various	5.649	0.000		0.000		0.000		-		0.000	0.000	5.649	5.649
Operational Test & Evaluation	MIPR	JITC : Fairfax, VA	0.000	0.167	Feb 2018	0.150	Feb 2019	0.250	Feb 2020	-		0.250	1.095	1.662	2.000
Operational Test & Evaluation	WR	SSC : San Diego, CA	0.000	0.165	Nov 2017	0.000		0.000		-		0.000	0.000	0.165	0.500
Development Test & Evaluation	MIPR	DTIC : Ft Belvoir, VA	0.000	0.373	Feb 2018	0.000		0.000		-		0.000	0.000	0.373	0.500
		Subtotal	5.649	0.705		0.150		0.250		-		0.250	1.095	7.849	N/A

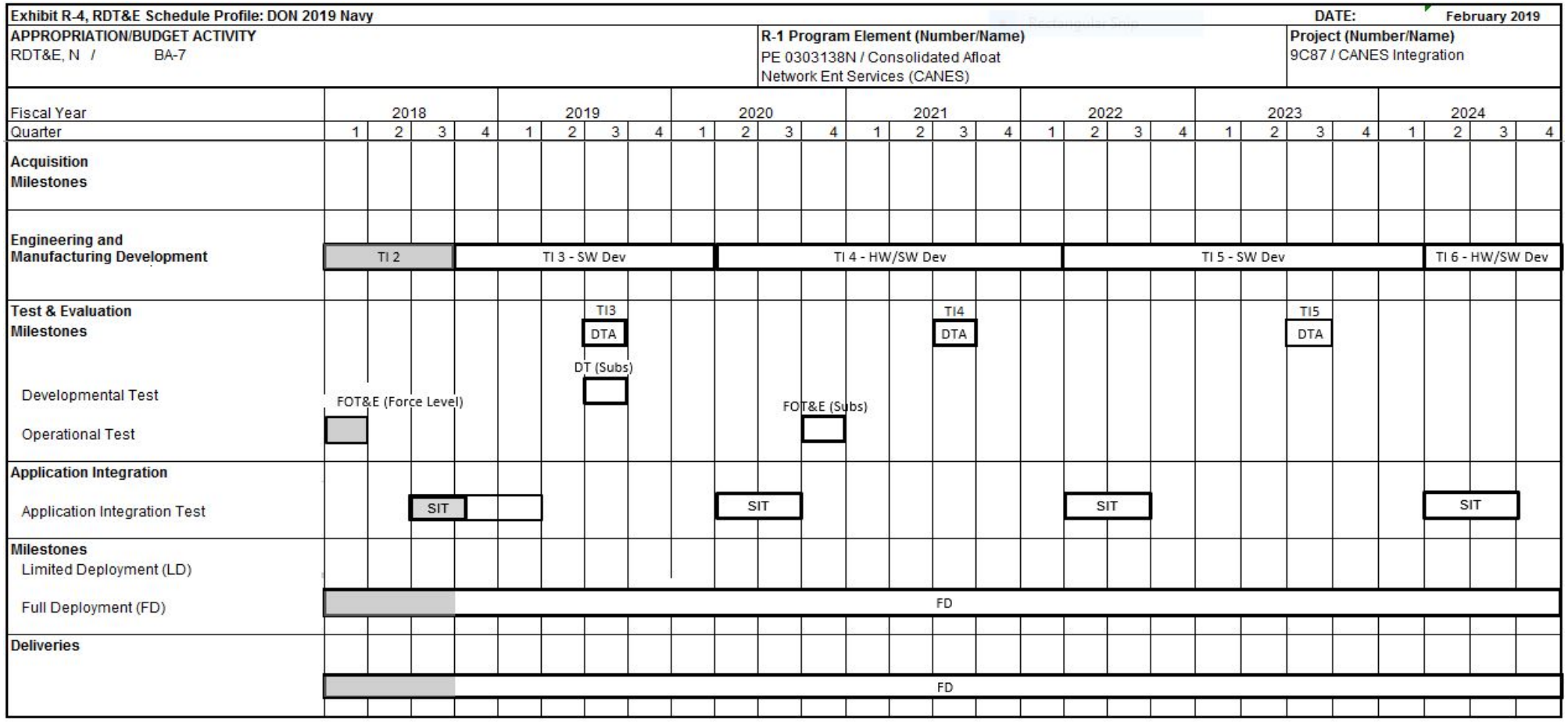
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Management Services	Various	Various : Various	12.239	0.000		0.000		0.000		-		0.000	0.000	12.239	12.239
Program Management	C/CPFF	STF : San Diego, CA	0.000	0.055	Dec 2017	0.060	Dec 2018	0.058	Dec 2019	-		0.058	0.438	0.611	1.000
		Subtotal	12.239	0.055		0.060		0.058		-		0.058	0.438	12.850	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	202.863	24.197		23.697		22.052		-		22.052	172.944	445.753	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		**Date:** March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 9C87 / *CANES Integration*



TI: Technical Insertion; DT: Development Testing; DTA: Development Testing Assist; FOT&E: Force Level Follow-On Test and Evaluation; SIT: Software Integration Test; FD: Full Deployment

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303138N / *Consolidated Afloat Network Ent Services(CANES)*	**Project (Number/Name)** 9C87 / *CANES Integration*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Fiscal Year				
Engineering and Manufacturing Development: Platform: Engineering and Manufacturing Development - TI 2 Hardware (HW)/SW Development	1	2018	3	2018
Engineering and Manufacturing Development: Platform: Engineering and Manufacturing Development - TI 3 SW Development	4	2018	1	2020
Engineering and Manufacturing Development: Platform: Engineering and Manufacturing Development - TI 4 HW/SW Development	2	2020	1	2022
Engineering and Manufacturing Development: Platform: Engineering and Manufacturing Development - TI 5 SW Development	2	2022	1	2024
Engineering and Manufacturing Development: Platform: Engineering and Manufacturing Development - TI 6 Hardware (HW)/SW Development	2	2024	4	2024
Test & Evaluation Milestone: Development Test: Development Test Assist- TI 3	3	2019	3	2019
Test & Evaluation Milestone: Development Test: Development Test Assist- TI 4	3	2021	3	2021
Test & Evaluation Milestone: Development Test: Development Test Assist- TI 5	3	2023	3	2023
Test & Evaluation Milestone: Development Test: Developmental Test - Sub	3	2019	3	2019
Test & Evaluation Milestone: Operational Test: Operational Test Force Level - Follow-on Operational Test & Evaluation (FOT&E)	1	2018	1	2018
Test & Evaluation Milestone: Operational Test: Operational Test - FOT&E Sub	4	2020	4	2020
Application Integration: Application Integration SIT 2	3	2018	1	2019
Application Integration: Application Integration SIT 3	2	2020	3	2020
Application Integration: Application Integration SIT 4	2	2022	3	2022
Application Integration: Application Integration SIT 5	2	2024	3	2024
Production Milestone: Production Milestone - Full Deployment (FD)	1	2018	4	2024
Deliveries: Deliveries - Full Deployment (FD)	1	2018	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0303140N *I Information Sys Security Program*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	455.305	49.310	44.228	41.853	-	41.853	38.841	33.632	33.921	34.635	Continuing	Continuing
0734: *Communications Security R&D*	437.286	46.904	41.954	39.713	-	39.713	36.671	31.416	31.665	32.334	Continuing	Continuing
3230: *Information Assurance*	18.019	2.406	2.274	2.140	-	2.140	2.170	2.216	2.256	2.301	Continuing	Continuing

A. Mission Description and Budget Item Justification

FY2020 funding request was reduced by ($0.616) million to account for the availability of prior year execution balances.

The Information Systems Security Program (ISSP) ensures the protection of Navy and Navy hosted joint telecommunication and Information Technology (IT) systems from cyber exploitation and attack. The ISSP extends cybersecurity to ensure confidentiality, integrity, and availability of these systems and content processed, stored, or transmitted therein by performing the acquisition, modernization and sustainment of cybersecurity platforms and systems; cyberspace operations include both defensive and offensive measures, which preserve the ability to protect data, networks, net-centric capabilities, and other designated systems while projecting power by the application of force in or through cyberspace. The ISSP includes the protection of the Navy's National Security Systems (NSS). The ISSP must be rapid, predictive, adaptive, and tightly coupled to cyberspace technology. The ISSP provides cybersecurity systems and infrastructure based on mission impacts, cybersecurity threats, information criticality, vulnerabilities, and required defensive countermeasure capabilities.

The ISSP focuses on efforts that address the risk management of cyberspace, which provides capabilities to protect, detect, restore and respond. The ISSP provides the Navy with the following cybersecurity elements: (1) defense of NSS, including the Nuclear Command, Control, and Communications, Navy (NC3-N) system, naval weapons systems, critical naval infrastructure for Command, Control, Communications, Computers, & Intelligence (C4I) afloat and shore networks, joint time and navigation systems, and industrial control systems, using modern cryptographic solutions and cyber security tools; (2) technologies for the Navy's Computer Network Defense (CND) service provider that accelerates the Navy's ability to prevent, constrain, and mitigate cyber attacks and critical vulnerabilities; (3) Navy Cyber Situational Awareness (NCSA) technologies that provides the operational context for cyber threat intelligence and Situational Awareness (SA), from external boundaries to tactical edge infrastructures; (4) assurance of the Navy's Cryptography (Crypto) telecommunications infrastructure and the wireless spectrum; (5) sensing cyber threats across all Navy shore and afloat networks to expand the capabilities of monitoring, assessing, and detecting adversary activities across multiple enclaves through the collection of tools in SHARKCAGE; (6) alignment to Navy's Insider Threat program; (7) assurance of joint-user cyberspace domains, using a Defense-In-Depth (DiD) security architecture and its alignment with the Joint Information Environment (JIE)/Joint Regional Security Stack (JRSS); (8) assurance technologies, including Key Management (KM) and Public Key Infrastructure (PKI).

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303140N *I Information Sys Security Program*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	50.269	44.228	44.823	-	44.823
Current President's Budget	49.310	44.228	41.853	-	41.853
Total Adjustments	-0.959	0.000	-2.970	-	-2.970
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.959	0.000			
• Program Adjustments	0.000	0.000	-3.016	-	-3.016
• Rate/Misc Adjustments	0.000	0.000	0.046	-	0.046

Change Summary Explanation

The FY 2020 funding request was reduced by $(0.616) million to account for the availability of prior year execution balances.

TECHNICAL:

Key Management (KM):
- Capability Increment (CI)-2 Spiral 2 Full Deployment Decision (FDD) renamed to CI-2 Maintenance Revision (MR)-2 Milestone FDD.

SCHEDULE:

Navy Cryptography (Crypto):
- KGV-11M Development Contract Award shifted from Q2FY18 to Q4FY18, in accordance with the schedule. Contract awarded July 2018.
- KGV-11M Development and Product Testing start date shifted from Q3FY18 to Q4FY18, and end date shifted from Q2FY20 to Q3FY20, in accordance with the schedule.
- Next Generation Crypto Development removed from schedule due to undefined National Security Agency (NSA) requirements; effort had not been funded, therefore funding remains the same.

Key Management (KM):
- Capability Increment (CI)-2 Spiral 2 Maintenance Revision (MR)-2 Milestone Full Deployment Decision (FDD) shifted from Q2FY18 to Q4FY19 in accordance with NSA schedule.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303140N *I Information Sys Security Program*

- CI-2 Spiral 2 Spin 3 Development, Integration and Test completion shifted from Q3FY17 to Q2FY19.
- Key Management Infrastructure (KMI) Tech Refresh Development, Integration and Test completion shifted from Q4FY17 to Q2FY20 in accordance with NSA schedule.
-CI-3 Spiral 3 Spin 1 initial Development, Integration and Test shifted from Q1FY18 to Q3FY18 in accordance with NSA schedule.
- KMI Tech Refresh initial delivery shifted from Q4FY18 to Q3FY20 in accordance with NSA schedule.

FUNDING:

Navy Cryptography (Crypto)(-$2.738M):
- FY20 decrease is due to the finalization of the development efforts of KGV-11M End Cryptographic Units (ECU).

SHARKCAGE (+$1.474M):
- FY20 increase is to continue development of the SHARKCAGE Defensive Cyberspace Offensive (DCO) enclave to address requirements from the fleet in light of emerging threats in the tactical environment. The increase will also incorporate NC3-N development efforts (details held at a higher classification).

Navy Cyber Situational Awareness (NCSA) (-$1.331M):
- FY20 decrease reflects a realignment within NCSA from Research, Development, Test and Evaluation (RDTE) to Operations and Maintenance, Navy (OMN) based on program requirements shifting from development to procurement, integration and sustainment.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0303140N / *Information Sys Security Program*	Project (Number/Name) 0734 / *Communications Security R&D*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
0734: *Communications Security R&D*	437.286	46.904	41.954	39.713	-	39.713	36.671	31.416	31.665	32.334	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The FY 2020 funding request was reduced by .616 million to account for the availability of prior year execution.

The Information Systems Security Program (ISSP) Research Development Test & Evaluation (RDT&E) efforts extend our cybersecurity and resiliency, provide Defensive Cyberspace Operations (DCO), and cross domain solutions to protect data, Department of Defense (DoD) Information Networks (DoDIN), net-centric operations, the forward deployed, and other designated systems in order to protect cyberspace and critical warfighting capabilities.

This project includes a rapidly evolving development, design and application integration effort to modernize cryptographic equipment and ancillaries with state-of-the-art replacements to counter evolving and increasingly sophisticated threats. Communications Security (COMSEC) and Transmission Security (TRANSEC) are evolving from stand-alone, dedicated devices to embedded modules incorporating National Security Agency (NSA) approved cryptographic engines, loaded with the certified algorithms and keys, and interconnected via industry-defined interfaces. This includes the DoDIN capability requirements document for the development of Content Based Encryption (CBE).

Computer Network Defense (CND): The CND program provides cyberspace capabilities to secure the Cyber Domain. CND is a combination of hardware, software, sets of processes and protective measures that use computer networks to detect, monitor, protect, analyze and defend against network infiltrations resulting in service/network denial, degradation and disruptions. CND enables a government or military institute/organization to defend against network attacks perpetrated by malicious or adversarial computer systems or networks.

Navy Cryptography (Crypto): Navy Crypto modernizes legacy cryptographic equipment which includes families of COMSEC and TRANSEC devices that are divided into crypto voice, crypto data, crypto products and associated ancillary devices. These devices provide modern cryptographic solutions to replace obsolete, legacy devices within the crypto categories.

Key Management (KM): KM monitors and tracks capability verification testing, designs and tests capabilities to provide a net-centric web based architecture, for the ordering, management, and distribution of all cryptographic key material to support Navy users, to include integration of Intermediary Application (iApp).

Public Key Infrastructure (PKI): The DoD PKI program, under the authority of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD AT&L), develops and tests PKI equipment and is responsible for meeting statutory and regulatory requirements for the DoD PKI program. The Navy PKI program tests and implements products for afloat networks and shore non-Navy Marine Corps Intranet (NMCI) networks and institutionalizes Identity and Access Management (IdAM) so that person and non-person entities can securely access all authorized DoD resources.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*

SHARKCAGE: SHARKCAGE is a global, federated Defensive Cyberspace Operations (DCO) enclave consisting of shore sensor nodes, DCO analysis workbenches, and analytic suites. Utilizing one-way passive taps in a protected, isolated, classified environment, SHARKCAGE consolidates cyber event data from multiple platforms and networks, providing Navy DCO forces with a shared environment and common platform for integrated workflow, collaboration, and analysis. SHARKCAGE efficiently detects, correlates, and analyzes nation and non-nation state attacks against maritime Navy networks and the Naval Networking Environment (NNE).

Navy Cyber Situational Awareness (NCSA): NCSA is a command and control infrastructure that provides Navy commanders with timely, trusted, and comprehensive Situational Awareness (SA) of the cyberspace domain to include tailored, near real-time visualization of network health, vulnerabilities, and operational readiness through the correlation of data from multiple sources. NCSA combines asset data, baseline configuration data, and real-time threat data which is critical for defending a fully-interconnected network infrastructure. NCSA enables early threat detection and timely decision making.

Cybersecurity Services: Cybersecurity Services develop cyber architecture and provides cybersecurity engineering for the Department of the Defense (DoD) and Department of the Navy (DoN) cybersecurity interests based on the requirements prioritized by Fleet Cyber Command/Commander Tenth Fleet (FCC/C10F). Cybersecurity Services transitions new technologies to address current Navy cybersecurity challenges.

FY20 will focus on efforts that address the risk management of cyberspace, which provides capabilities to protect, detect, restore and respond. The ISSP provides the Navy with the following cybersecurity elements: (1) defense of National Security Systems (NSS), including the Nuclear Command, Control, and Communications, Navy (NC3-N) system, naval weapons systems, critical naval infrastructure for Command, Control, Communications, Computers, & Intelligence (C4I) afloat and shore networks, joint time and navigation systems, and industrial control systems, using modern cryptographic solutions and cyber security tools; (2) technologies supporting the Navy's Computer Network Defense (CND) service provider that will help the Navy's ability to prevent, constrain, and mitigate cyber attacks and critical vulnerabilities; (3) Navy Cyber Situational Awareness (NCSA) technologies that provides the operational context for cyber threat intelligence and Situational Awareness (SA), from external boundaries to tactical edge infrastructures; (4) assurance of the Navy's Crypto telecommunications infrastructure and the wireless spectrum; (5) sensing cyber threats across all Navy shore and afloat networks to expand the capabilities of monitoring, assessing, and detecting adversary activities across multiple enclaves through the collection of tools in SHARKCAGE; (6) alignment to Navy's Insider Threat program; (7) assurance of joint-user cyberspace domains, using a Defense-In-Depth (DiD) security architecture and its alignment with the Joint Information Environment (JIE)/Joint Regional Security Stack (JRSS); (8) assurance technologies, including the Key Management (KM) and Public Key Infrastructure (PKI).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Computer Network Defense (CND)	14.039	13.160	13.501	0.000	13.501
Articles:	-	-	-	-	-
FY 2019 Plans: Continue to develop Navy's portion of the Nuclear Command, Control, and Communications, Navy (NC3-N) and Ballistic Missile Defense (BMD) cyber security system of systems within the CND architecture. Continue to develop, integrate, and test CND Inc 2 Builds, Defense-in-Depth (DiD), and Situational Awareness (SA)					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
technologies for knowledge-empowered CND operations for shore sites and afloat platforms within Navy's Outside Continental United States (OCONUS) Navy Enterprise Network (ONE-Net) and Command, Control, Communication, Computers, & Intelligence (C4I) networks to achieve improved network defense and security wholeness. Continue enhancing the Vulnerability Remediation Asset Manager (VRAM) tool, to include Security Technical Implementation Guide (STIG) Reporting Integration and web services to share data between VRAM, cyber readiness databases and mission support systems. Continue to evaluate needs derived from stakeholders and the CND Capabilities Steering Group (CCSG), and correspondingly develop, update, and integrate CND suites. Continue to implement Department of Defense (DoD) and United States Cyber Command (USCC) cybersecurity tools and mandates into ONE-Net and C4I networks. Continue to provide technical guidance to support Consolidated Afloat Network and Enterprise Services (CANES) deployment of new CND capabilities. Continue to optimize CND suite for alignment with Joint Regional Security Stack (JRSS), including the transition of some capabilities from the CND suite into JRSS. Continue efforts to further virtualize CND capabilities for more effective and cost-efficient deployment of cybersecurity technologies. Continue to develop, integrate, and test solution to replace and assume acquisition management of Navy Cyber Defense Operations Command's (NCDOC) tactical sensor infrastructure. Continue development and alignment to Navy's Insider Threat program to identify possible insider threats across multiple enclaves in order to fulfill the Presidential, DoD, and Department of Navy (DoN) directives. ***FY 2020 Base Plans:*** Due to the dynamic nature of cybersecurity and increasing complexity of technology, CND Inc 2 Builds will continue technical refresh and capability enhancement R&D efforts. In addition, CND Inc 2 will continue to develop and enhance Navy's portion of the NC3-N and BMD cyber security system of systems within the CND architecture. CND Inc 2 Build 9 will complete Email Gateway capability and Next Generation Firewall upgrades to address end of life issues, enable centralized firewall management functionality, and enhance security of the network. CND Build 9 will also complete Virtual Hosting Environment (VTE) hardware and software upgrades and enhancements including remote replication and hosting of critical endpoint security management servers. CND Inc 2 Builds 10 and 11 will begin the cybersecurity enhancements for VRAM to improve DoD cyber readiness and upgrade to VRAM 3.0 with improved capabilities in response to urgent Operation Orders (OPRDs) and Tasking Orders (TASKORDs). Begin major CND operating system upgrades, out of band management network Hardware and software switching, routing and firewall upgrades and Next Generation Intrusion Prevention and Content Scanning System upgrades. CND will continue to implement DoD and USCC cybersecurity tools and mandates into ONE-Net and C4I networks. Continue to provide technical guidance to support CANES deployment of new CND capabilities. Continue to optimize CND suite for alignment with JRSS,					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
including the transition of some capabilities from the CND suite into JRSS. Continue efforts to further virtualize CND capabilities for more effective and cost-efficient deployment of cybersecurity technologies. Continue to develop, integrate, and test solution to replace and assume acquisition management of NCDOC tactical sensor infrastructure. Continue development and alignment to Navy's Insider Threat program to identify possible insider threats across multiple enclaves in order to fulfill the Presidential, DoD, and DoN directives. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant changes from FY19 to FY20; no programmatic impact.					
Title: Navy Cryptography (Crypto) ***Articles:*** ***FY 2019 Plans:*** Continued development of Advanced Cryptographic Capabilities (ACC) security software of various Communications Security (COMSEC) devices and compatibility of cryptographic devices capable of receiving software updates. Continue developing a transition plan for Transmission Security (TRANSEC) and ACC for crypto modernization. Continue KGV-11M product development and continue developmental testing. Complete KGV-11M Preliminary Design Review (PDR). Complete KGV-11M Critical Design Review (CDR). Continue to provide development and security engineering for modernization of Department of the Navy (DoN) crypto systems and embeddable crypto modernization strategies. Continue to work with National Security Agency (NSA) on certification authority and data testing for all crypto modernization efforts. Continue to investigate impacts of upcoming NSA security enhancements for crypto modernization products. Continue to enhance and modernize VINSON/Advanced Narrowband Digital Voice Terminal (ANDVT) Cryptographic Modernization (VACM) ancillary devices. Continue to develop Navy strategy and implementation plan to modernize secure voice architectures within Navy networks. ***FY 2020 Base Plans:*** FY20 decrease is due to finalization of the development efforts of KGV-11M End Cryptographic Units (ECU). Continue development of ACC security software of various Communications Security (COMSEC) devices and compatibility of cryptographic devices capable of receiving software updates. Continue developing a transition plan for TRANSEC and ACC for crypto modernization. Continue KGV-11M product development and continue developmental testing. Complete KGV-11M Developmental Test & Evaluation (DT&E). Receive KGV-11M NSA Certification to initiate the Full Rate Production for KGV-11M. Continue to provide development	10.962 -	13.565 -	10.827 -	0.000 -	10.827 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and security engineering for modernization of DoN crypto systems and embeddable crypto modernization strategies. Continue to work with NSA on certification authority and data testing for all crypto modernization efforts. Continue to investigate impacts of upcoming NSA security enhancements for crypto modernization products. Continue to enhance and modernize VACM ancillary devices. Continue to develop Navy strategy and implementation plan to modernize secure voice architectures within Navy networks. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 decrease of -$2.738 million is due to the finalization of the development efforts of KGV-11M End Cryptographic Units (ECU).					
Title: Key Management (KM)	2.230	0.823	0.802	0.000	0.802
Articles:	-	-	-	-	-
FY 2019 Plans: Achieve Full Operational Test & Evaluation (FOT&E) and Full Deployment Decision (FDD) for Key Management Infrastructure (KMI) Capability Increment (CI)-2 Spiral 2 Maintenance Revision (MR)-2. Continue the development, engineering and testing of KMI CI-2. Continue migrating Communications Security (COMSEC) Management Workstation (CMWS) and the follow on to Simple Key Loader (SKL) into the KMI environment. Continue the development, engineering and testing of KMI CI-3, including the integration of the Intermediary Application (iApp) within a network environment, which will enhance the accounting for and distribution of KMI key delivery. Continue the development, engineering and testing of KMI Tech Refresh. ***FY 2020 Base Plans:*** Continue migrating COMSEC CMWS and the follow on to SKL into the KMI environment. Continue the development, engineering and testing of KMI CI-3, including the integration of iApp within a network environment, which will enhance the accounting for and distribution of KMI key delivery. Continue the development, engineering and testing of KMI Tech Refresh. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
No significant changes from FY19 to FY20; no programmatic impact.					
Title: Public Key Infrastructure (PKI) ***Articles:*** ***FY 2019 Plans:*** Continue Navy compliance and compatibility with Department of Defense (DoD) Public Key Infrastructure PKI implementation, cryptographic algorithms and development efforts, to include Computer Network Defense (CND), Elliptic Curve Cryptography (ECC), Secure Hash Algorithms (SHA-256) and other encryption methodologies, Navy Certificate Validation Infrastructure (NCVI), Common Access Card (CAC), Alternate Logon Token (ALT), and Secret Internet Protocol Router Network (SIPRNet) Token. Continue research, test and evaluation of Network (NIPRNet) Enterprise Alternate Token System (NEATS), Non-Person Entity (NPE), PKI authentication capabilities to support mobile devices, Identity and Access Management (IdAM) technologies, and Real-time Automated Personnel Identification System (RAPIDS) Operating Systems (OS). ***FY 2020 Base Plans:*** Continue Navy compliance and compatibility with DoD PKI implementation, cryptographic algorithms and development efforts, to include CND, ECC, SHA-256 and other encryption methodologies, NCVI, CAC, ALT, and SIPRNet Token. Continue research, test and evaluation of NEATS, NPE, PKI authentication capabilities to support mobile devices, IdAM technologies, and RAPIDS OS. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant changes from FY19 to FY20; no programmatic impact.	0.360 -	0.366 -	0.373 -	0.000 -	0.373 -
Title: SHARKCAGE ***Articles:*** ***FY 2019 Plans:*** Continue development of SHARKCAGE Defensive Cyberspace Operations (DCO) enclave to address requirements from the fleet in light of emerging threats in the tactical environment. Development efforts include network taps, sensors, and analytic toolsets for passively monitoring multiple Navy shore and afloat networks and enclaves (e.g., Command, Control, Communications, Computers and Intelligence (C4I) networks, Combat Systems (CS), Hull, Mechanical, and Electrical (HM&E), etc.) to detect and assess cyber threats across multiple	8.973 -	5.322 -	6.796 -	0.000 -	6.796 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
security enclaves. Continue development of event collection and analysis components for shore sensor nodes and afloat flyaway kits for deployed Cyber Protection Teams (CPT). ***FY 2020 Base Plans:*** FY20 increase will begin development efforts to incorporate Nuclear Command, Control, and Communications, Navy (NC3-N) missions within the SHARKCAGE environment (details held at a higher classification). Continue development of SHARKCAGE DCO enclave to address requirements from the fleet in light of emerging threats in the tactical environment. Development efforts include network taps, sensors, and analytic toolsets for passively monitoring multiple Navy shore and afloat networks and enclaves (e.g., C4I networks, CS, HM&E, etc.) to detect and assess cyber threats across multiple security enclaves. Continue development of event collection and analysis components for shore sensor nodes and afloat flyaway kits for deployed CPT. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 $1.474M increase is to continue development of the SHARKCAGE DCO enclave to address requirements from the fleet in light of emerging threats in the tactical environment, specifically the NC3-N development efforts which are required to build an NC3-N enclave within the SHARKCAGE environment (details held at a higher classification).					
Title: Navy Cyber Situational Awareness (NCSA)	7.840	6.356	5.025	0.000	5.025
Articles:	-	-	-	-	-
FY 2019 Plans: Continue the integration of all-source intelligence with Navy maritime data to enable early threat detection, and assessment of adversary activities and capabilities, intent, and access to critical Navy networks. Continue the development of a shared and tailorable Maritime Cyber "Integrated" " Common Operational Pictures (COP) external to Fleet Cyber Command/Commander Tenth Fleet (FCC/C10F) beginning with Commander, Pacific Fleet (COMPACFLT) Maritime Operations Center (MOC) to enable assessments of cyber vulnerabilities, threats, and risks relative to Ballistic Missile Defense (BMD) and Nuclear Command, Control, and Communications, Navy (NC3-N) missions. NCSA maturation will continue to provide monitoring of relevant and current Navy networks providing near real-time visualization and analytics of the cyberspace domain. ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue the integration of all-source intelligence with Navy maritime data to enable early threat detection, and assessment of adversary activities and capabilities, intent, and access to critical Navy networks. Continue the development of a shared and tailorable Maritime Cyber "Integrated" COP external to FCC/C10F to include all geographic MOCs to enable assessments of cyber vulnerabilities, threats, and risks relative to Navy missions. NCSA maturation will provide monitoring of relevant and current Navy networks providing near real-time visualization and analytics of the cyberspace domain. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 decrease of -$1.331 million reflects a realignment within NCSA from Research, Development, Test and Evaluation (RDTE) to Operations and Maintenance, Navy (OMN) based on program requirements shifting from development to procurement, integration and sustainment.					
Title: Cybersecurity Services	2.500	2.362	2.389	0.000	2.389
Articles:	-	-	-	-	-
FY 2019 Plans: Continue coordination and alignment with Joint Information Environment (JIE) (e.g., Joint Regional Security Stack (JRSS), Joint Management System (JMS), Tactical Processing Node (TPN) etc.) to ensure Navy architecture requirements for tactical networks are met. Continue to provide security systems engineering support for the development of Department of Defense (DoD) and Department of Navy (DoN) cybersecurity architectures and the transition of new technologies to address Navy cybersecurity challenges. Continue to provide updates to reflect emerging priorities and address Navy specific threats. Continue to coordinate cybersecurity activities across the virtual System Command (SYSCOM) via the Cybersecurity Trusted Architecture (TA) to ensure the security design and integration of cybersecurity products and services is consistent across the Navy for major initiatives such as the future afloat, ashore, and Outside of the Continental United States (OCONUS) networks. Continue to provide cybersecurity risk analysis and recommended risk mitigation strategies for Navy critical networks and Command, Control, Communication, Computers, & Intelligence (C4I) systems. Continue to coordinate with the Navy acquisition community to ensure cybersecurity requirements are identified and addressed within the development cycles for emerging Navy network and C4I capabilities. Continue to evaluate products for security issues and develop guidance and procedures for the design and integration of risk mitigation strategies via appropriate cybersecurity controls. ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue coordination and alignment with JIE (e.g., JRSS, JMS, Tactical Processing Node (TPN) etc.) to ensure Navy architecture requirements for tactical networks are met. Continue to provide security systems engineering support for the development of DoD and DoN cybersecurity architectures and the transition of new technologies to address Navy cybersecurity challenges. Continue to provide updates to reflect emerging priorities and address Navy specific threats. Continue to coordinate cybersecurity activities across the virtual SYSCOM via the Cybersecurity TA to ensure the security design and integration of cybersecurity products and services is consistent across the Navy for major initiatives such as the future afloat, ashore, and OCONUS networks. Continue to provide cybersecurity risk analysis and recommended risk mitigation strategies for Navy critical networks and C4I systems. Continue to coordinate with the Navy acquisition community to ensure cybersecurity requirements are identified and addressed within the development cycles for emerging Navy network and C4I capabilities. Continue to evaluate products for security issues and develop guidance and procedures for the design and integration of risk mitigation strategies via appropriate cybersecurity controls. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant changes from FY19 to FY20; no programmatic impact.					
Accomplishments/Planned Programs Subtotals	46.904	41.954	39.713	0.000	39.713

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3415: *Info Sys Security Program (ISSP)*	88.946	151.828	166.540	-	166.540	170.829	169.077	172.442	175.873	Continuing	Continuing

Remarks

D. Acquisition Strategy

Computer Network Defense (CND): The CND Acquisition Category (ACAT) IVM program is a layered protection strategy, which militarizes Commercial Off-The-Shelf (COTS) and integrates Government Off-The-Shelf (GOTS) hardware and software products that collectively provide an effective network security infrastructure. The rapid advancement of cyber technology requires an efficient process for updating CND tools deployed to afloat and shore platforms. Recognizing the need for future CND capability improvements, the CND program implements an evolutionary acquisition strategy that delivers CND capabilities in multiple builds and functionality releases that address validated requirements.

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Navy Cryptography (Crypto): Modernized crypto devices will replace legacy crypto in accordance with the mandate by Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6510 as well as the National Security Agency (NSA) planned decertification, which improves the Navy's cyber defense posture. For Advanced Cryptographic Capability (ACC) the acquisition strategy will follow the NSA direction on mandated software upgrades. The planned KGV-11M program will be led by the Navy.

Key Management (KM): Key Management Infrastructure (KMI) is a NSA-led ACAT I program. It is the next generation Electronic Key Management System (EKMS) that provides the infrastructure for management, ordering and distribution of key material as well as directly supporting the key requirements of all Crypto modernization efforts. KMI will follow an increment/spiral development strategy. The KMI program will continue to develop alternative architecture implementations for communities within the Navy to implement the Intermediary Application (iApp) as a KM solution.

Public Key Infrastructure (PKI): Department of Defense (DoD) PKI is an ACAT I program jointly led by the NSA and the Defense Information Systems Agency (DISA). The Under Secretary of Defense for Acquisition, Technology and Logistics (USD AT&L) is the Milestone Decision Authority (MDA). The Navy PKI project supports the DoD-wide implementation of PKI products and services across Navy afloat, non-Navy Marine Corps Intranet (NMCI), Outside the Continental United States (OCONUS) networks and other excepted networks.

SHARKCAGE: The SHARKCAGE Rapid Deployment Capability (RDC) effort will integrate Commercial Off-The-Shelf (COTS) and Government Off-The Shelf (GOTS) hardware and software products to monitor multiple Navy networks and enclaves to detect, analyze, and assess threats. SHARKCAGE will provide Navy Cyber Defense Operations Command (NCDOC), Navy Information Operations Centers (NIOC), Fleet Cyber Command/Commander Tenth Fleet (FCC/C10F), Cyber Protection Teams (CPT), and other Computer Network Defense (CND) deployers with a global Defensive Cyberspace Operations (DCO) enclave to monitor the Naval Networking Environment (NNE) and maritime Navy networks, including Navy shore sites and afloat platforms conducting Ballistic Missile Defense (BMD) and Nuclear Command, Control, and Communications, Navy (NC3-N) missions.

Navy Cyber Situational Awareness (NCSA): The NCSA RDC effort will integrate COTS and GOTS hardware and software products to provide visualization of Navy networks and enclaves to analyze and assess mission threats. NCSA will be implemented via an evolutionary acquisition approach using an iterative, agile software enhancement process in the form of capability drops to address future cyber Situation Awareness (SA) capabilities and improvements required by fleet warfighters. These government-led agile software enhancements will be documented and managed through a requirements governance board process.

Cybersecurity Services: Cybersecurity Services is a Navy project, which develops cyber architecture and provides security engineering for the DoD and Department of the Navy (DoN) cybersecurity interests based on the requirements prioritized by Fleet Cyber Command/Commander Tenth Fleet (FCC/C10F). Cybersecurity Services transitions new technologies to address current Navy cybersecurity challenges.

E. Performance Metrics

Computer Network Defense (CND):
* Provide the ability to protect from, react to, and restore operations after an intrusion or other catastrophic event through validated contingency plans for 100% of CND systems.

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* Develop dynamic security defense capabilities, based on the CND posture as an active response to threat attack sensors and vulnerability indications to provide adequate defenses against subversive acts of trusted people and systems, both internal and external, by integration of anomaly-based detection solutions into the design solutions for 100% of authorized Navy enclaves.
* Defend against the unauthorized use of a host or application, particularly operating systems, by development and/or integration of host-based intrusion prevention system design solutions for 100% of authorized Navy enclaves.

Navy Cryptography (Crypto):
* Meet 100% of Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6510 Cryptographic Modernization (CM) requirements within the current Fiscal Year Defense Plan (FYDP) by conducting a gap analysis and building a CM roadmap and implementation plan to allow Naval Information Forces (NAVIFOR) to establish operational priorities based on risk assessments. The gap analysis is an effort to analyze current integrated legacy cryptographic devices within the Department of the Navy (DoN) inventory with known algorithm vulnerability dates, assess lifecycle sustainment issues, and identify transition device schedules, where they exist.
* Meet 100% of Top Secret (TS) and SECRET CJCSI 6510 requirements by fielding modern cryptographic devices or request "key extension" via the Joint Staff Military Command, Control, Communications, and Computers Executive Board (MC4EB).
* Increase the functionality of cryptographic devices by replacing two legacy cryptographic devices with one modern device, where possible, identify, and implement modern small form factor, multi-channel cryptography devices.

Key Management (KM):
* Meet 100% of DoN, US Coast Guard (USCG) KM requirements. USCG and Military Sealift Command (MSC) replace existing Electronic Key Management System (EKMS) Tier 2 systems with a Key Management Infrastructure (KMI) Intermediary Application (iApp). Littoral Combat Ship (LCS) implements iApp to automate key deliveries to the platforms.
* Incorporate 100% of the Communication Security (COMSEC) Manager Workstation (CMWS) requirements into the iApp baseline to meet KMI Capability Increment (CI)-2 and KMI CI-3 capabilities.

Public Key Infrastructure (PKI):
* Provide integration support to ensure Navy networks and programs of record comply with Department of Defense (DoD) PKI requirements on Non-classified Internet Protocol Router Network (NIPRNet) and Secret Internet Protocol Router Network (SIPRNet), per DoD Instruction 8520.02.
* Ensure 100% interoperability with DoD and Federal partners by researching and evaluating enhanced cryptographic algorithms and DoD PKI certificate changes.

SHARKCAGE:
* Deliver a global Defensive Cyberspace Operations (DCO) enclave that conducts monitoring and analysis of network traffic and event data to detect, correlate, and assess cyber threats to the Naval Networking Environment (NNE).
* Continue to develop and enhance SHARKCAGE capabilities in order to meet the Navy Cyber Situational Awareness (NCSA) Urgent Operational Need (UON) as defined by Fleet Cyber Command/Commander Tenth Fleet (FCC/C10F).

Navy Cyber Situational Awareness (NCSA):

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* Deliver a maritime Cyber Common Operational Picture (COP) tailored to a fleet Maritime Operations Center (MOC) area of responsibility to provide operational impacts based on cyber events.
* Continue to develop and enhance NCSA capabilities in order to meet the NCSA UON as defined by FCC/C10F.

Cybersecurity Services:
* Ensure 100% interoperability and application of commercial standards compliance for Information Systems Security Program (ISSP) products by researching and conducting selective evaluations, integrating and testing Commercial Off-The-Shelf (COTS)/Non-Developmental Item cybersecurity products. Evaluation may include defensible network boundary capabilities such as firewalls, secure routers and switches, guards, Virtual Private Networks (VPN), and network Intrusion Prevention Systems (IPS).
* Provide 100% of the services delineated in Office of the Chief of Naval Operations Instruction (OPNAVINST) 5239.1C by serving as the Navy's cybersecurity technical lead by developing cybersecurity risk analysis and recommended risk mitigation strategies for critical Navy networks and Command, Control, Communications, Computers, and Intelligence (C4I) systems.
* Coordinate cybersecurity activities across the Navy Enterprise via the Cybersecurity Trusted Architecture (TA) to measure effectiveness of Navy networks. Ensure the security design and integration of Computer Adaptive Network Defense-in-Depth (CANDiD) products and services and that they are 100% interoperable and operationally acceptable across the Navy for major initiatives such as the future afloat, ashore, and Outside the Continental United States (OCONUS) networks.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware Development (WR)	WR	SSC PAC : San Diego, CA	12.208	2.953	Oct 2017	2.750	Oct 2018	2.641	Oct 2019	-		2.641	Continuing	Continuing	Continuing
Hardware Development	C/CPFF	SSC PAC : San Diego, CA	3.376	0.869	Dec 2017	0.809	Dec 2018	0.777	Dec 2019	-		0.777	Continuing	Continuing	Continuing
Hardware Development (WR)	WR	SSC LANT : Charleston, SC	5.074	0.570	Oct 2017	0.531	Oct 2018	0.510	Oct 2019	-		0.510	Continuing	Continuing	Continuing
Hardware Development	C/CPFF	SSC LANT : Charleston, SC	1.759	1.068	Jan 2018	0.995	Jan 2019	0.956	Jan 2020	-		0.956	Continuing	Continuing	Continuing
Software Development (WR)	WR	SSC PAC : San Diego, CA	23.718	8.831	Oct 2017	7.746	Oct 2018	6.860	Oct 2019	-		6.860	Continuing	Continuing	Continuing
Software Development	C/CPFF	SSC PAC : San Diego, CA	6.693	5.610	Dec 2017	5.040	Dec 2018	4.840	Dec 2019	-		4.840	Continuing	Continuing	Continuing
Software Development (WR)	WR	SSC LANT : Charleston, SC	6.512	2.232	Oct 2017	2.079	Oct 2018	1.997	Oct 2019	-		1.997	Continuing	Continuing	Continuing
Software Development	C/CPFF	SSC LANT : Charleston, SC	9.305	4.138	Jan 2018	3.854	Jan 2019	3.701	Jan 2020	-		3.701	Continuing	Continuing	Continuing
Software Development	FFRDC	MITRE : McLean, VA	2.822	2.022	Dec 2017	1.883	Dec 2018	1.808	Dec 2019	-		1.808	Continuing	Continuing	Continuing
Software Development	Various	Various : Various	66.988	0.532	Dec 2017	0.495	Dec 2018	0.475	Dec 2019	-		0.475	Continuing	Continuing	Continuing
Software Development	C/CPFF	BAH : San Diego, CA	5.726	2.801	Jan 2018	2.609	Jan 2019	2.506	Jan 2020	-		2.506	Continuing	Continuing	Continuing
Software Development	FFRDC	GTRI : Atlanta, GA	8.821	7.873	Jan 2018	6.266	Jan 2019	6.017	Jan 2020	-		6.017	Continuing	Continuing	Continuing
Software Development	WR	NSMA : San Diego, CA	2.113	1.631	Dec 2017	1.519	Oct 2018	1.459	Oct 2019	-		1.459	Continuing	Continuing	Continuing
Software Development	WR	NRL : Washington DC	2.155	0.903	Dec 2017	0.841	Oct 2018	0.808	Oct 2019	-		0.808	Continuing	Continuing	Continuing
Development (PY)	Various	Various : Various	190.205	0.000		0.000		0.000		-		0.000	0.000	190.205	-
		Subtotal	347.475	42.033		37.417		35.355		-		35.355	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Architecture	WR	Various : Various	5.663	0.248	Oct 2017	0.231	Oct 2018	0.222	Oct 2019	-		0.222	Continuing	Continuing	Continuing
Architecture	WR	SSC LANT : Charleston, SC	2.029	0.473	Oct 2017	0.441	Oct 2018	0.424	Oct 2019	-		0.424	Continuing	Continuing	Continuing
Studies & Design	WR	Various : Various	6.255	0.415	Oct 2017	0.387	Oct 2018	0.372	Oct 2019	-		0.372	Continuing	Continuing	Continuing
Requirements Analysis	C/CPFF	BAH : San Diego, CA	5.847	0.416	Jan 2018	0.387	Jan 2019	0.372	Jan 2020	-		0.372	Continuing	Continuing	Continuing
		Subtotal	19.794	1.552		1.446		1.390		-		1.390	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System DT&E	WR	SSC PAC : San Diego, CA	37.965	0.333	Oct 2017	0.310	Oct 2018	0.298	Oct 2019	-		0.298	Continuing	Continuing	Continuing
System DT&E	WR	COTF : Norfolk, VA	1.307	0.729	Dec 2017	0.679	Dec 2018	0.652	Dec 2019	-		0.652	Continuing	Continuing	Continuing
System DT&E	C/CPFF	BAH : San Diego, CA	1.360	0.858	Jan 2018	0.799	Jan 2019	0.767	Jan 2020	-		0.767	Continuing	Continuing	Continuing
		Subtotal	40.632	1.920		1.788		1.717		-		1.717	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/CPFF	BAH : San Diego, CA	29.385	1.399	Jan 2018	1.303	Jan 2019	1.251	Jan 2020	-		1.251	Continuing	Continuing	Continuing
		Subtotal	29.385	1.399		1.303		1.251		-		1.251	Continuing	Continuing	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	437.286	46.904		41.954		39.713		-		39.713	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
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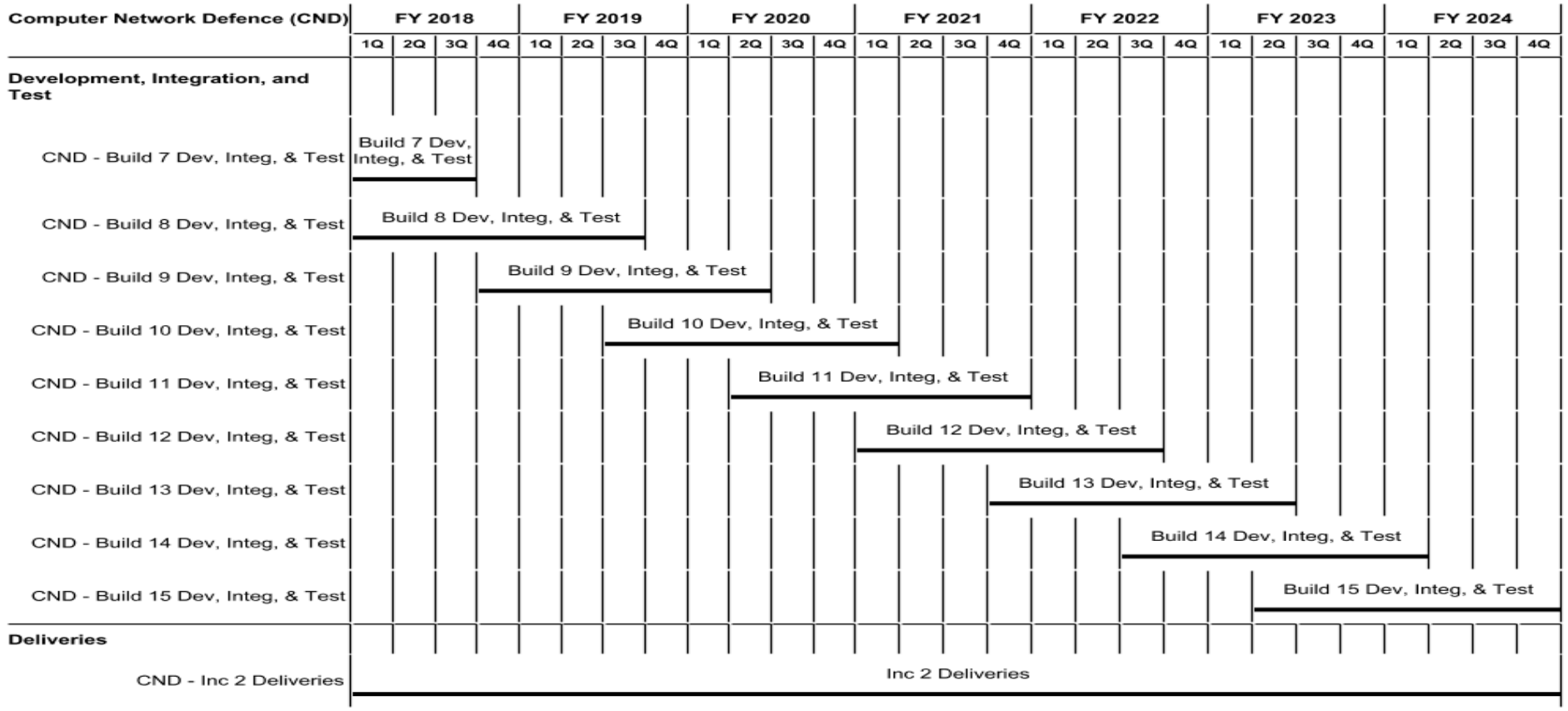

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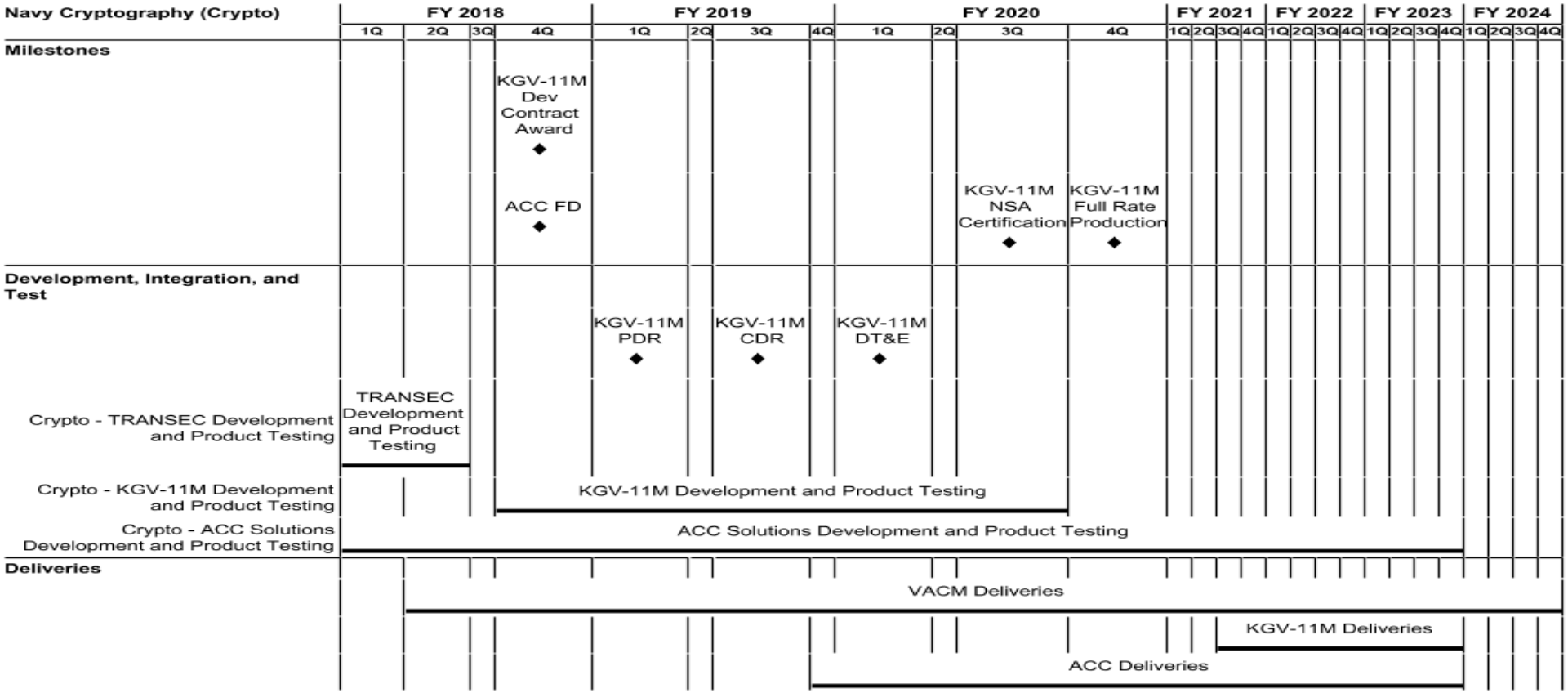
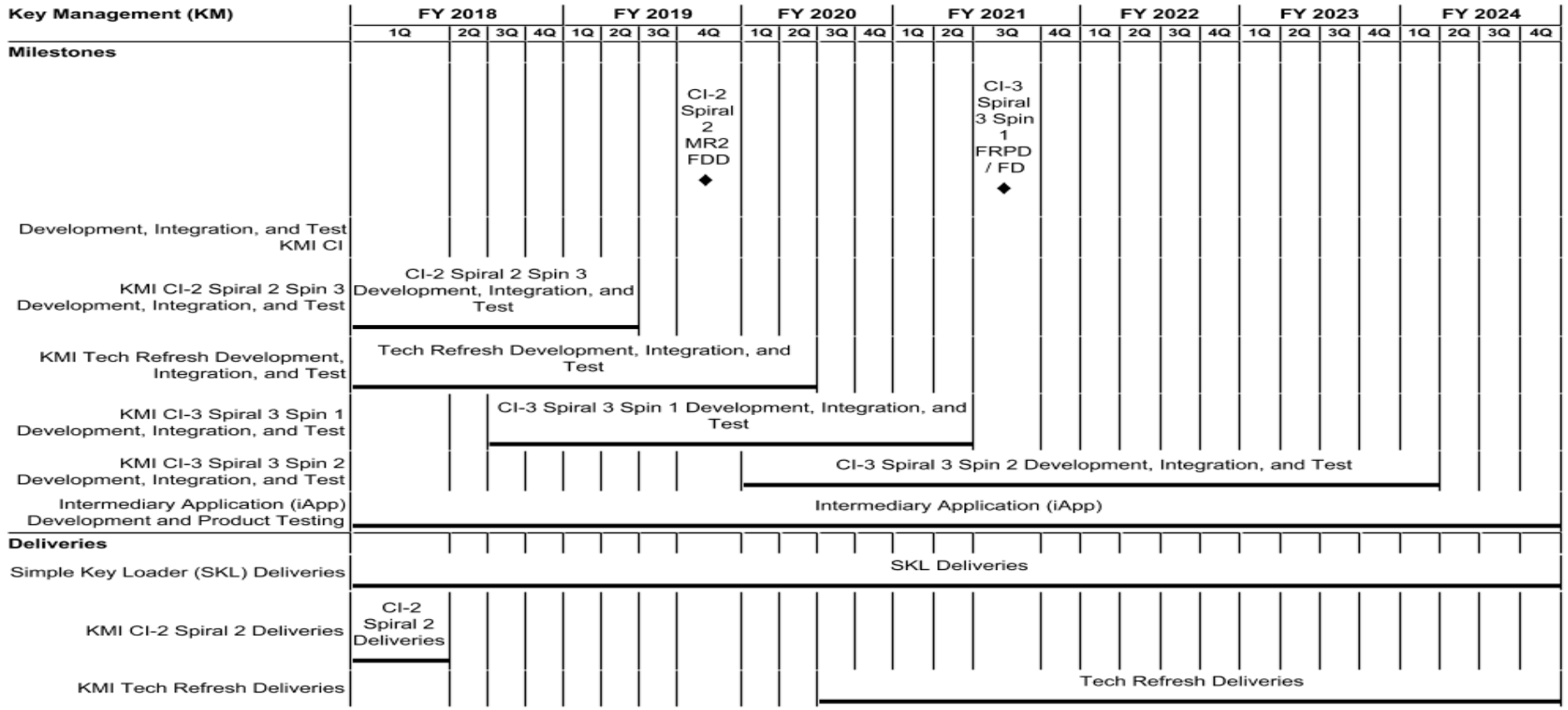
Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*



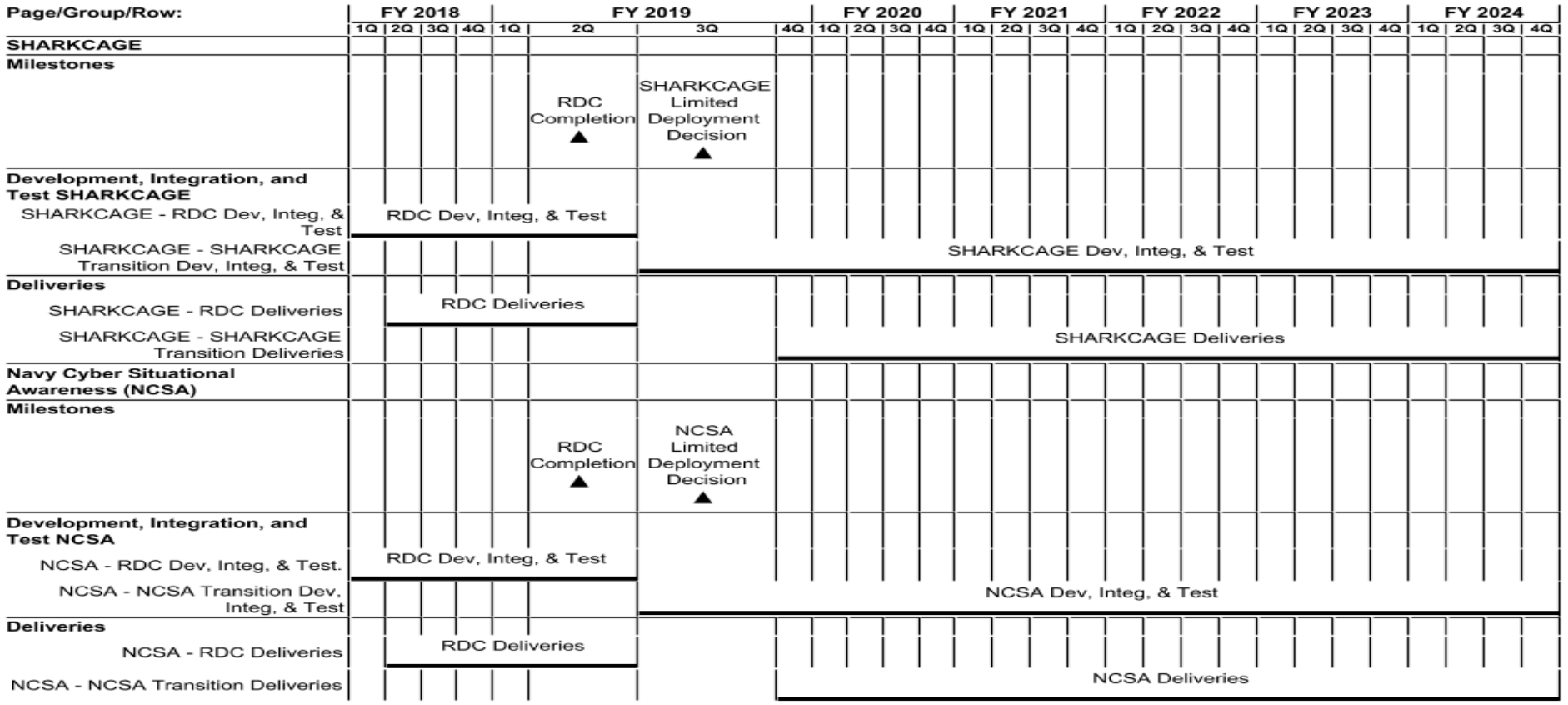
2020PB - 0303140N - 0734

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*



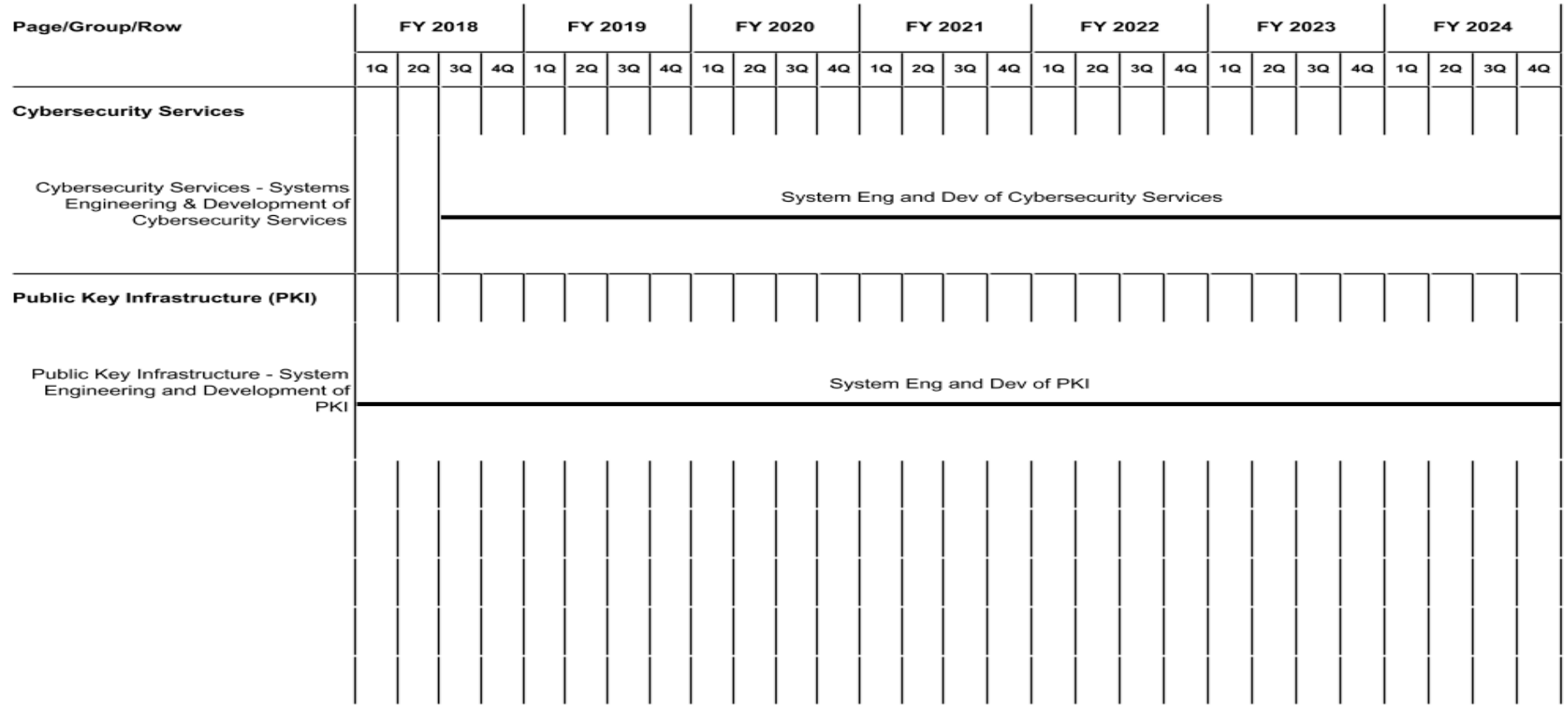
2020PB - 0303140N - 0734

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*



2020PB - 0303140N - 0734

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*



2020PB - 0303140N - 0734

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Computer Network Defence (CND)				
Development, Integration, and Test: CND - Build 7 Dev, Integ, & Test:	1	2018	3	2018
Development, Integration, and Test: CND - Build 8 Dev, Integ, & Test:	1	2018	3	2019
Development, Integration, and Test: CND - Build 9 Dev, Integ, & Test:	4	2018	2	2020
Development, Integration, and Test: CND - Build 10 Dev, Integ, & Test:	3	2019	1	2021
Development, Integration, and Test: CND - Build 11 Dev, Integ, & Test:	2	2020	4	2021
Development, Integration, and Test: CND - Build 12 Dev, Integ, & Test:	1	2021	3	2022
Development, Integration, and Test: CND - Build 13 Dev, Integ, & Test:	4	2021	2	2023
Development, Integration, and Test: CND - Build 14 Dev, Integ, & Test:	3	2022	1	2024
Development, Integration, and Test: CND - Build 15 Dev, Integ, & Test:	2	2023	4	2024
Deliveries: CND - Inc 2 Deliveries:	1	2018	4	2024
Navy Cryptography (Crypto)				
Milestones: Crypto - KGV-11M Development Contract Award	4	2018	4	2018
Milestones: Crypto - ACC Fielding Decision (FD)	4	2018	4	2018
Milestones: Crypto - KGV-11M NSA Certification	3	2020	3	2020
Milestones: Crypto - KGV-11M Full Rate Production	4	2020	4	2020
Development, Integration, and Test: Crypto - KGV-11M PDR	1	2019	1	2019
Development, Integration, and Test: Crypto - KGV-11M CDR	3	2019	3	2019
Development, Integration, and Test: Crypto - KGV-11M DT&E	1	2020	1	2020
Development, Integration, and Test: Crypto - TRANSEC Development and Product Testing:	1	2018	2	2018
Development, Integration, and Test: Crypto - KGV-11M Development and Product Testing:	4	2018	3	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Development, Integration, and Test: Crypto - ACC Solutions Development and Product Testing:	1	2018	4	2023
Deliveries: Crypto - VACM Deliveries	2	2018	4	2024
Deliveries: Crypto - KGV-11M Deliveries	3	2021	4	2023
Deliveries: Crypto - ACC Deliveries	4	2019	4	2023
Key Management (KM)				
Milestones: KMI CI-2 Spiral 2 MR2 Full Deployment Decision (FDD)	4	2019	4	2019
Milestones: KMI CI-3 Spiral 3 Spin 1 FRP Decision / FD	3	2021	3	2021
Milestones: KMI CI-2 Spiral 2 Spin 3 Development, Integration, and Test:	1	2018	2	2019
Milestones: KMI Tech Refresh Development, Integration, and Test:	1	2018	2	2020
Milestones: KMI CI-3 Spiral 3 Spin 1 Development, Integration, and Test:	3	2018	2	2021
Milestones: KMI CI-3 Spiral 3 Spin 2 Development, Integration, and Test:	1	2020	1	2024
Milestones: Intermediary Application (iApp) Development and Product Testing:	1	2018	4	2024
Deliveries: Simple Key Loader (SKL) Deliveries:	1	2018	4	2024
Deliveries: KMI CI-2 Spiral 2 Deliveries:	1	2018	1	2018
Deliveries: KMI Tech Refresh Deliveries:	3	2020	4	2024
Page/Group/Row:				
Milestones: SHARKCAGE - RDC Completion	2	2019	2	2019
Milestones: SHARKCAGE - SHARKCAGE Transition Limited Deployment Decision	3	2019	3	2019
Development, Integration, and Test SHARKCAGE: SHARKCAGE - RDC Dev, Integ, & Test:	1	2018	2	2019
Development, Integration, and Test SHARKCAGE: SHARKCAGE - SHARKCAGE Transition Dev, Integ, & Test:	3	2019	4	2024
Deliveries: SHARKCAGE - RDC Deliveries:	2	2018	2	2019
Deliveries: SHARKCAGE - SHARKCAGE Transition Deliveries:	4	2019	4	2024
Milestones: NCSA - RDC Completion	2	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 0734 / *Communications Security R&D*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Milestones: NCSA - NCSA Transition Limited Deployment Decision	3	2019	3	2019
Development, Integration, and Test NCSA: NCSA - RDC Dev, Integ, & Test.:	1	2018	2	2019
Development, Integration, and Test NCSA: NCSA - NCSA Transition Dev, Integ, & Test:	3	2019	4	2024
Deliveries: NCSA - RDC Deliveries:	2	2018	2	2019
Deliveries: NCSA - NCSA Transition Deliveries:	4	2019	4	2024
Page/Group/Row				
Cybersecurity Services: Cybersecurity Services - Systems Engineering & Development of Cybersecurity Services:	3	2018	4	2024
Public Key Infrastructure (PKI): Public Key Infrastructure - System Engineering and Development of PKI:	1	2018	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0303140N / *Information Sys Security Program*				Project (Number/Name) 3230 / *Information Assurance*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3230: *Information Assurance*	18.019	2.406	2.274	2.140	-	2.140	2.170	2.216	2.256	2.301	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The goal of the Information Assurance (IA) program is to ensure the continued protection of Navy and joint information and information systems from hostile exploitation and attack. The Information Systems Security Program (ISSP) activities address the triad of Defense Information Operations: protection, detection, and reaction. Evolving attack sensing (detection), warning, and response (reaction) responsibilities extend far beyond the traditional ISSP role in protection of Information Systems Security (INFOSEC). Focused on the highly mobile forward deployed subscriber, the Navy's adoption of Network-Centric Warfare (NCW) places demands upon the ISSP, as the number of users expands significantly and the criticality of their use escalates. Today, the ISSP protects an expanding core of services critical to the effective performance of the Navy's mission.

The rapid rate of change in the underlying commercial and government information infrastructures makes the provision of security an increasingly complex and dynamic problem. IA technology mix and deployment strategies must evolve quickly to meet rapidly evolving threats and vulnerabilities. No longer can information security be divorced from the information infrastructure. The ISSP enables the Navy's war fighter to trust in the availability, integrity, authentication, privacy, and non-repudiation of information.

This project includes funds for advanced technology development, test and evaluation of naval information systems security based on leading edge technologies that will improve information assurance (e.g., situational awareness and information infrastructure protection) across all command echelons to tactical units afloat and war fighters ashore. This effort will provide the research to develop a secure seamless interoperable, common operational environment of networked information systems in the battle space and for monitoring and protecting the information infrastructure from malicious activities. This effort will provide naval forces a secure capability and basis in its achievement of protection from unauthorized access and misuse, and optimized IA resource allocations in the information battle space. This program will also develop core technology to: (1) improve network infrastructure resistance and resiliency to attacks; (2) enable the rapid development and certification of security-aware applications and information technologies in accordance with the common criteria for IA and IA-enabled information technology products by the National Security Telecommunications and Information Systems Security Committee; and (3) measure the effectiveness and efficiency of IA defensive capabilities under naval environments.

The program will develop common architectural frameworks that facilitate integration of network security capabilities, enable effective seamless interoperation, and contribute to a common consistent picture of the networked environment with respect to information assurance and security. This effort will address the need for a common operational picture for IA, as well as assessment of security technology critical to the success of the mission. This effort will also initiate requirements definition for situational awareness capabilities to support computer network defense in a highly-distributed, homogeneous, and heterogeneous networks including mobile and embedded networked devices. This effort also includes the architectural definition of situational awareness and visualization capabilities to support active computer network defense and support underlying data mining and correlation tools. This includes addressing the capability to remotely manage and securely control the configurations of network security components to implement changes in real time or near real time. This program will also initiate requirements definition for secure

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 3230 / *Information Assurance*

coalition data exchange and interoperation among security levels and classifications, and ensure approaches address various security level technologies as well as emerging architectural methods of providing interoperability across different security levels. IA will examine multi-level aware applications and technologies including databases, web browsers, routers/switches, etc. Efforts will also initiate infrastructure protection efforts as the Navy develops network centric architectures and warfare concepts, ensuring an evolutionary development of security architectures and products for IA that addresses Navy infrastructure requirements. IA will ensure the architectures evolve to provide proper protection as technology, Department of Defense (DoD) missions, and threats continuously evolve. IA includes defensive protections as well as intrusion monitoring (sensors), warning mechanisms, and response capabilities in the architecture. Ensure the unique security and performance requirements of tactical systems, including those operating various security levels are addressed. Also, the program will initiate the efforts to conceptualize new network centric warfare technology to protect our assets, such as secure network gateways, routers, components and tools that improve the survivability of Navy networks. Additionally, IA will provide systems security engineering, certification and accreditation support for high-confidence naval information systems and ensure certification and accreditation approaches are consistent with Navy and DoD requirements.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Information Assurance (IA)	2.406	2.274	2.140	0.000	2.140
Articles:	-	-	-	-	-
FY 2019 Plans: Continue the development of a new techniques/technology for discovering adversarial presence in Navy/ DoD networks, especially for APT within the network infrastructure and components/ workstations. Efforts will focus on detection, isolation and remediation while maintaining continuity of operations and access to critical data. Continue systems security engineering, certification and accreditation support for high-confidence, high criticality naval information systems and ensure certification and accreditation approaches are consistent with Navy and DoD requirements. Continue the development of new technology to support asset criticality and management to improve effectiveness of cyber defenses in support of mission execution, focusing on threats and attack propagation through the network. Continue the development of a new generation of cross-domain technology that focuses on critical infrastructure protection while protecting against sophisticated nation state attacks and exfiltration, while supporting new data models and formats for emerging Navy networks. Initiate the development of intelligent security components and infrastructure capable of protecting the DON's critical cyber assets through intelligent, autonomous self-diagnostics, automated damage assessment, and self-healing capabilities. Initiate the development of a framework to systematically identify optimal and pertinent features of cyber behavior data in order to detect anomalies. Anomalies stemming from malicious cyber activity (e.g., intrusions, denial of service, malware) will be identified, as well as the development of metrics indicating the health and security posture of the cyber resources. Initiate the development of algorithms that automatically identify the feature space and select the optimal feature set from the given cyber data, the network traffic, and the interconnectivity of the cyber resources.					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 3230 / *Information Assurance*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete the development of a new techniques/technology for discovering adversarial presence in Navy/ DoD networks, especially for APT within the network infrastructure and components/workstations. Efforts will focus on detection, isolation and remediation while maintaining continuity of operations and access to critical data. Complete the development of new technology to support asset criticality and management to improve effectiveness of cyber defenses in support of mission execution, focusing on threats and attack propagation through the network. Continue systems security engineering, certification and accreditation support for high-confidence, high criticality naval information systems and ensure certification and accreditation approaches are consistent with Navy and DoD requirements. Continue the development of a new generation of cross-domain technology that focuses on critical infrastructure protection while protecting against sophisticated nation state attacks and exfiltration, while supporting new data models and formats for emerging Navy networks. Continue the development of intelligent security components and infrastructure capable of protecting the DON's critical cyber assets through intelligent, autonomous self-diagnostics, automated damage assessment, and self-healing capabilities. Continue the development of a framework to systematically identify optimal and pertinent features of cyber behavior data in order to detect anomalies. Anomalies stemming from malicious cyber activity (e.g., intrusions, denial of service, malware) will be identified, as well as the development of metrics indicating the health and security posture of the cyber resources. Continue the development of algorithms that automatically identify the feature space and select the optimal feature set from the given cyber data, the network traffic, and the interconnectivity of the cyber resources. Initiate the development of tools to automatically analyze and reverse engineer malware of unknown provenance at scale. Includes rapid prototyping and fielding of novel digital content inspection mechanisms that identify indicators of compromise and generate tailored defensive countermeasures to emerging cyber threats. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The funding decrease from FY19 to FY20 reflects the minor realignment of resources from the current Program Element (PE), Project, and Accomplishments/Planned Programs associated with various rate adjustments and other minor non-programmatic net zero adjustments across the ONR research portfolio.					
Accomplishments/Planned Programs Subtotals	2.406	2.274	2.140	0.000	2.140

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 3230 / *Information Assurance*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Protection of Navy and Joint information from hostile exploitation and attack.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0303140N / *Information Sys Security Program*	Project (Number/Name) 3230 / *Information Assurance*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	Various	NRL : Washington, DC	18.019	2.406	Nov 2017	2.274	Nov 2018	2.140	Nov 2019	-		2.140	Continuing	Continuing	Continuing
		Subtotal	18.019	2.406		2.274		2.140		-		2.140	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	18.019	2.406		2.274		2.140		-		2.140	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 3230 / *Information Assurance*

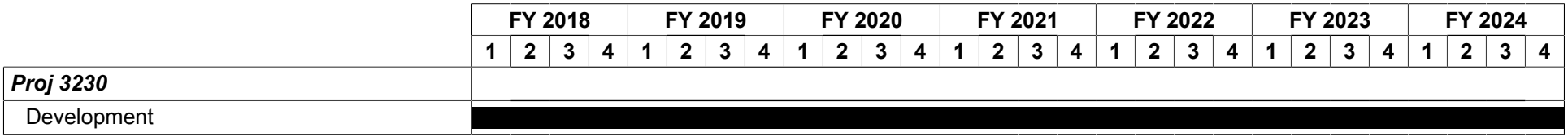


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0303140N / *Information Sys Security Program*	**Project (Number/Name)** 3230 / *Information Assurance*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3230				
Development	1	2018	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305204N *I Tactical Unmanned Aer Vehicles*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	261.852	7.770	8.529	9.451	-	9.451	9.484	9.660	9.441	9.630	Continuing	Continuing
2478: *Tactical Control System*	261.852	7.770	8.529	9.451	-	9.451	9.484	9.660	9.441	9.630	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element provides funding for development and capability requirements for Tactical Unmanned Aerial Vehicles. Project is a Joint Military Intelligence Program.

The Tactical Control System (TCS), a component of the MQ-8 System, provides software for the joint tactical MQ-8 Fire Scout System. TCS, integrated into the MQ-8 Mission Control System, provides the warfighters with the capability for day/night aerial Intelligence, Surveillance and Reconnaissance, target acquisition, voice, data and command and control communications/relay, and mine detection and localization. Additionally, TCS provides a multi-level, scalable, and flexible operator control of the air vehicles and payloads, as well as direct receipt and dissemination of unmanned aerial vehicle sensor data.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	7.770	8.529	9.471	-	9.471
Current President's Budget	7.770	8.529	9.451	-	9.451
Total Adjustments	0.000	0.000	-0.020	-	-0.020
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	-0.020	-	-0.020

Change Summary Explanation

Increase in funding from FY 2019 to FY 2020 supports TCS Version 10 Common software development and transition.

Schedule: TCS schedule and software improvements coincide with MQ-8 Fire Scout schedule milestones.

Technical: None

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305204N / *Tactical Unmanned Aer Vehicles*	Project (Number/Name) 2478 / *Tactical Control System*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2478: *Tactical Control System*	261.852	7.770	8.529	9.451	-	9.451	9.484	9.660	9.441	9.630	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The TCS program supports the MQ-8 Fire Scout System and is a standards-based system, which provides interoperability and commonality for Command and Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) interfaces of Unmanned Aircraft Systems (UAS). TCS software, operating on Mission Control System (also referred to as a Ground Control Station) hardware, utilizes North Atlantic Treaty Organization (NATO) Standardization Agreements (STANAG)-4586 architecture to communicate across a Tactical Common Data Link.

TCS provides a full range of scalable UAS capabilities from passive receipt of air vehicle and payload data to full air vehicle and payload command and control. TCS offers the warfighter a common core operating environment to simultaneously receive, process, and disseminate data from different UAS types for intelligence, reconnaissance, surveillance, and combat assessment.

This program supports enhancements and updates to TCS in order to continue to meet supported air vehicle enhancements, incorporation of new technologies that will be used to enhance overall system performance, incorporate new payloads and payload capabilities (such as advanced sensors and weapons), incorporate multi-vehicle control, incorporate NATO STANAG-4586 and Command, Control, Communications, Computers and Intelligence enhancements, and alignment with OSD direction for UAS control segments. The FY20 funding supports Common Control System (CCS) integration into TCS and test with the MQ-8C radar program.

TCS software is incorporated into the MQ-8 Fire Scout System and fields in conjunction with MQ-8. TCS software addresses MQ-8 requirements validated by the Joint Requirements Oversight Council in the MQ-8 Capability Production Document (Nov 2016) and multiple Joint Emergent Operational Need/Urgent Operational Needs statements. TCS is supported by an Operational Requirements Document (Feb 2000).

TCS maximizes the use of contractor and government off-the-shelf hardware and software whenever possible and incorporates software/hardware enhancements where appropriate to maintain growth potential and minimize hardware and operating system dependence. TCS software is interoperable and is compliant with the OSD Command and Control, Communications, Intelligence Joint Technical Architecture, Distributed Common Ground System standards, Global Command and Control System, and NATO standards. TCS hardware and software upgrades support the Navy's CCS migration.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: TCS Development and Integration	7.038	7.742	8.660	0.000	8.660
Articles:	-	-	-	-	-
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continued TCS integration and test with MQ-8 development. Continued new TCS capabilities to support requirements for MQ-8 land-based efforts plus support for air capable ships (to include Littoral Combat Ship (LCS), Frigates (FFG(X)), and Expeditionary Support Bases (ESB). Continued TCS STANAG 4586 compliance. Continued TCS C4ISR interface integration and testing for MQ-8 systems. Continued hardware and operating system independence initiatives. Continue Radar and payload integration (to include Minotaur) and test, MQ-8C integration, and continue preparations for CCS integration and demonstrations. Completed TCS Version 8 Common GCS transition and initiated TCS Version 9 preparations, including integration of CCS Vehicle Management. ***FY 2020 Base Plans:*** Continue TCS integration and test with MQ-8 development. Continue new TCS capabilities to support requirements for MQ-8 land-based efforts plus support for air capable ships (to include Littoral Combat Ship (LCS), Frigates (FFG(X)), and Expeditionary Support Bases (ESB). Continue TCS STANAG 4586 compliance. Continue TCS C4ISR interface integration and testing for MQ-8 systems. Continue hardware and operating system independence initiatives. Continue Radar and payload integration (to include Minotaur) and test, MQ-8C integration, and continue preparations for Common Control System (CCS) integration and demonstrations. Complete TCS Version 9 and initiate TCS Version 10. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 to support TCS Version 10 software development and transition to include Minotaur and CCS integration.					
Title: Technical and Engineering Services	0.732	0.787	0.791	0.000	0.791
Articles:	-	-	-	-	-
FY 2019 Plans: Continue government engineering support, contractor support, program support, and travel for the TCS program. ***FY 2020 Base Plans:*** Continue government engineering support, contractor support, program support, and travel for the TCS program. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020					
Accomplishments/Planned Programs Subtotals	7.770	8.529	9.451	0.000	9.451

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The TCS program is government owned, non-proprietary software that currently supports the MQ-8 Fire Scout System. The TCS program continues to focus on Navy requirements and standards-based architecture/software to support interoperability. The government-owned TCS software development toolkit is available to all UAS developers and manufacturers that allows a low-cost integration into the open architecture non-proprietary TCS system. TCS integrates the Navy's Common Control System (CCS)software and will eventually migrate to the CCS hardware solution.

E. Performance Metrics

Successfully complete Navy payloads integration (to include, but not limited to: Coastal Battlefield Reconnaissance and Analysis (COBRA) and radar) in accordance with the MQ-8 Program of Record. Support MQ-8C Endurance Upgrade, Radar, and future capabilities. Successfully complete Littoral Combat Ship Integration. Complete Developmental and Operational Test.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305204N / *Tactical Unmanned Aer Vehicles*	Project (Number/Name) 2478 / *Tactical Control System*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Software Development 2	SS/CPIF	Raytheon : Falls Church,VA	45.272	7.034	Dec 2017	7.742	Dec 2018	8.660	Dec 2019	-		8.660	57.947	126.655	126.655
Prior Year Cost no longer Funded in the FYDP	C/CPAF	Raytheon : Falls Church,VA	195.332	0.000		0.000		0.000		-		0.000	0.000	195.332	195.332
Primary Software Development 2	SS/CPIF	NGC : San Diego, CA	0.173	0.000		0.000		0.000		-		0.000	0.000	0.173	0.173
		Subtotal	240.777	7.034		7.742		8.660		-		8.660	57.947	322.160	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test and Evaluation	WR	Various : Various	1.346	0.026	Nov 2017	0.027	Nov 2018	0.028	Nov 2019	-		0.028	Continuing	Continuing	Continuing
		Subtotal	1.346	0.026		0.027		0.028		-		0.028	Continuing	Continuing	N/A

Management Services ($ in Millions)

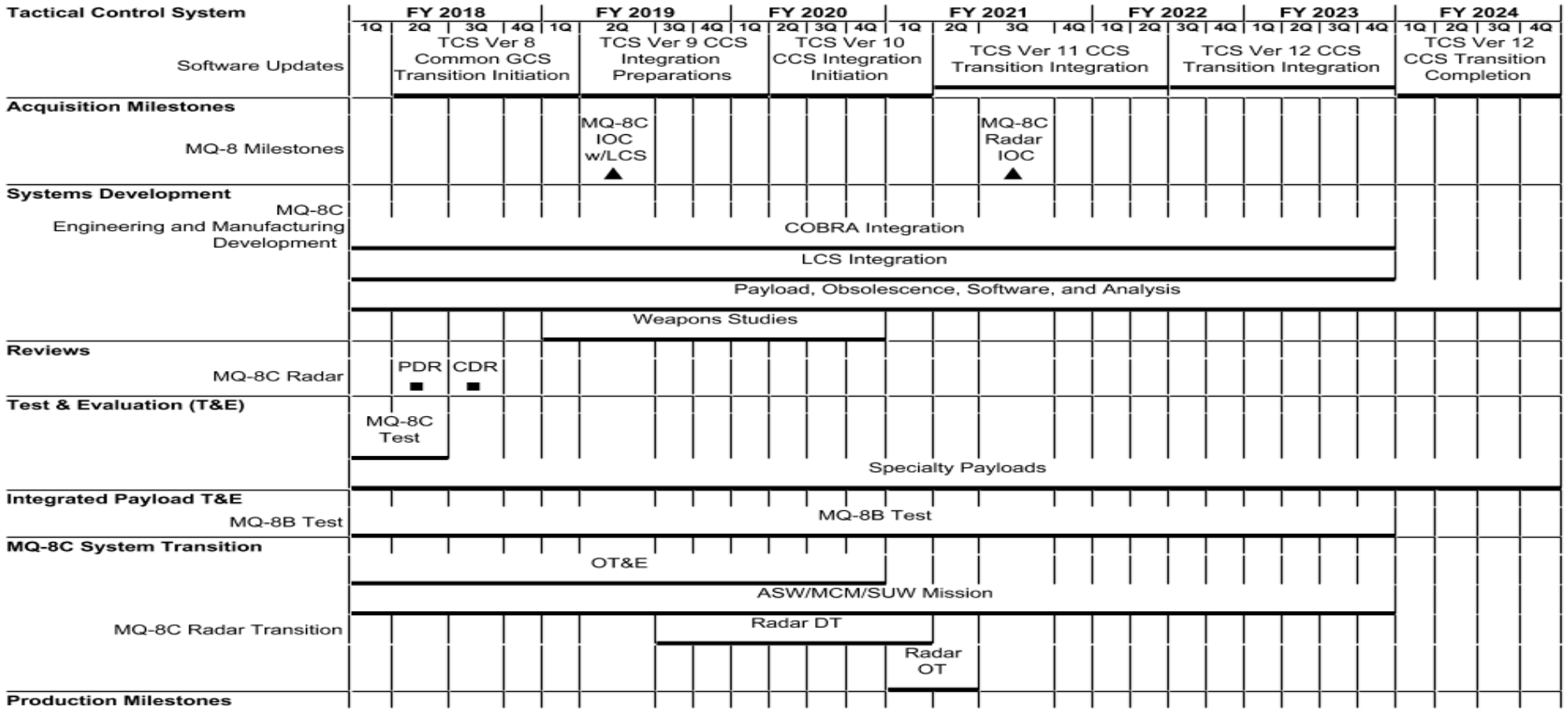
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	Various	Various : Various	3.983	0.245	Nov 2017	0.268	Nov 2018	0.258	Nov 2019	-		0.258	Continuing	Continuing	Continuing
Government Engineering Support	WR	Various : Various	10.407	0.283	Nov 2017	0.268	Nov 2018	0.274	Nov 2019	-		0.274	Continuing	Continuing	Continuing
Program Management Support	Various	Various : Various	4.947	0.158	Nov 2017	0.199	Nov 2018	0.205	Nov 2019	-		0.205	Continuing	Continuing	Continuing
Travel	WR	NAVAIR : Patuxent River, MD	0.392	0.024	Nov 2017	0.025	Nov 2018	0.026	Nov 2019	-		0.026	Continuing	Continuing	Continuing
		Subtotal	19.729	0.710		0.760		0.763		-		0.763	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305204N / *Tactical Unmanned Aer Vehicles*	Project (Number/Name) 2478 / *Tactical Control System*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	261.852	7.770		8.529		9.451		-		9.451	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*



2020PB - 0305204N - 2478

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Tactical Control System				
Software Updates: TCS Ver 8 Common GCS Transition Initiation	2	2018	1	2019
Software Updates: TCS Ver 9 CCS Integration Preparations	2	2019	1	2020
Software Updates: TCS Ver 10 CCS Integration Initiation	2	2020	1	2021
Software Updates: TCS Ver 11 CCS Transition Integration	2	2021	2	2022
Software Updates: TCS Ver 12 CCS Transition Integration	3	2022	4	2023
Software Updates: TCS Ver 13 CCS Transition Completion	1	2024	4	2024
Acquisition Milestones: MQ-8 Milestones: MQ-8 Initial Operational Capability (IOC) MQ-8C Littoral Combat Ship (LCS)	2	2019	2	2019
Acquisition Milestones: MQ-8 Milestones: MQ-8C Radar IOC	3	2021	3	2021
Systems Development: Engineering and Manufacturing Development: Coastal Battlefield Reconnaissance and Analysis Integration (COBRA), BLK 1/2/3	1	2018	4	2023
Systems Development: Engineering and Manufacturing Development: Littoral Combat Ship (LCS) Integration	1	2018	4	2023
Systems Development: Engineering and Manufacturing Development: Payload, Obsolescence, Software, and Analysis	1	2018	4	2024
Systems Development: Engineering and Manufacturing Development: Weapons Studies	1	2019	4	2020
Reviews: MQ-8C Radar: Preliminary Design Review (PDR)	2	2018	2	2018
Reviews: MQ-8C Radar: Critical Design Review (CDR)	3	2018	3	2018
Test & Evaluation (T&E): MQ-8C Development Test	1	2018	2	2018
Test & Evaluation (T&E): Specialty Payloads	1	2018	4	2024
Integrated Payload T&E: MQ-8B Test: MQ-8B/C Test: Littoral Combat Ship (LCS) Integration	1	2018	4	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305204N / *Tactical Unmanned Aer Vehicles*	**Project (Number/Name)** 2478 / *Tactical Control System*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MQ-8C System Transition: Operational Test and Evaluation (OT&E)	1	2018	4	2020
MQ-8C System Transition: ASW/MCM/SUW Mission	1	2018	4	2023
MQ-8C System Transition: MQ-8C Radar Transition: Radar Developmental Test (DT)	3	2019	1	2021
MQ-8C System Transition: MQ-8C Radar Transition: Radar Operational Test (OT)	1	2021	2	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305205N *I (U)UAS Integration and Interoperability*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	63.745	20.848	24.663	42.315	-	42.315	66.056	60.571	43.067	40.761	Continuing	Continuing
3379: *Common Control System*	63.745	20.848	24.663	42.315	-	42.315	66.056	60.571	43.067	40.761	Continuing	Continuing

Note

The Common Control System (CCS) was budgeted in PE 06404404N prior to FY16.

A. Mission Description and Budget Item Justification

Common Control System (CCS) budget profile changes are due to program realignment to support CCS development and integration in support of MQ-25 Stingray, MQ-8 Fire Scout and follow on UxS platforms.

This PU funds the Unmanned Systems (UxSs) CCS. The primary mission of CCS is to provide common control across the Navy's UxSs portfolio to add scalable and adaptable warfighting capability, implement robust cybersecurity attributes, leverage existing government owned products, eliminate redundant software development efforts, consolidate product support, encourage innovation, improve cost control and enable rapid integration of UxS capabilities across Aviation, Surface, Sub-Surface, and Ground domains.

CCS is a ship/shore/airborne/expeditionary based common control system that provides Vehicle Management (VM) and Mission Management/Mission Planning (MM/MP) capabilities for Naval Group 1 through 5 Unmanned Air Vehicles (UAVs) as well as other domain UxSs. VM is the software that allows the operator to control the UxS. MM/MP is the software that allows the operator to create mission plans and control the UxS's sensors and payloads. CCS software is based on the Society of Automotive Engineers (SAE) Unmanned Control Segment (UCS) architecture which is a service oriented open architecture that is modular and scalable to meet evolving Service requirements and is also supportive of safety/airworthiness certification and cybersecurity certification and accreditation.

This program defines, develops, and delivers CCS capability that enables the flexibility for Ground Control Systems (GCS) that could be ship, shore, airborne, or expeditionary based to operate multiple and dissimilar Naval UxSs. CCS includes a common framework, user interface, and common components that will also be integrated and tested with legacy platform components. CCS is being developed with an open and modular business model with robust cybersecurity implementation and will be provided as Government Furnished Equipment (GFE) to UxS contractors as required.

The CCS acquisition approach provides increasing capability through incremental development for UxS platforms as follows:

Increment I delivered initial unmanned vehicle management (VM) functionality for MQ-25 Stingray in FY 2018, which included flight maneuvering and stationing, situational awareness, and health & performance status monitoring, hosted on legacy platform hardware. CCS VM functionality was delivered to MQ-8 Fire Scout in 1Q FY 2019 with another delivery scheduled for 3Q FY 2019.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305205N *I (U)UAS Integration and Interoperability*

Increment II builds upon CCS Increment I software delivery, adding discrete common MM/MP capabilities as well as maturing VM capabilities. These MM/MP capabilities include route planning, aerial refueling, sensor and payload control, and data processing and dissemination. CCS Increment II software will be hosted on legacy platform hardware. Increment II adds robust cybersecurity controls, key systems safety attributes and core program infrastructure, to include a system integration lab and software support activity (SSA). Additional efforts include developing and executing plans for integration of common CCS VM services already developed under this program into other UxS cross-domain platforms' control stations to reduce department-level Total Ownership Costs for unmanned Ground Control Systems.

Increment III provides common hardware for hosting CCS. CCS Increment III software will be developed and delivered with additional capabilities to include cross-domain capabilities and control of multiple dissimilar UxS for further enterprise-level Total Ownership Cost savings.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	39.736	41.212	40.446	-	40.446
Current President's Budget	20.848	24.663	42.315	-	42.315
Total Adjustments	-18.888	-16.549	1.869	-	1.869
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-16.549			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.088	0.000			
• Program Adjustments	0.000	0.000	1.908	-	1.908
• Rate/Misc Adjustments	0.000	0.000	-0.039	-	-0.039
• Congressional Directed Reductions Adjustments	-17.800	-	-	-	-

Change Summary Explanation

FY 2018 and FY 2019 program adjustments delayed and descoped Increment II software requirements and development which resulted in a re-phase of Increment II deliveries across the FYDP.

FY 2020 increase in funding supports CCS Increment II and III efforts.

Schedule Changes:
Added Milestone B 1Q 2019

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305205N *I (U)UAS Integration and Interoperability*

Changed CCS Increment I Software Development to extend to 3Q 2019
Changed CCS Delivery to MQ-8 from 2Q 2019 to 3Q 2019 to align with platform schedule
Changed CCS Increment II Software Development start to 3Q 2019 and extended to 4Q 2024
Changed CCS V2.0 Release from 2Q 2020 to 2Q 2021
Changed CCS V2.1 Release from 1Q 2021 to 4Q 2022
Changed CCS V2.2 Release from 1Q 2022 to 4Q 2023
Changed CCS V2.3 Release from 1Q 2023 to 3Q 2024
Changed CCS DT&E/OT Support from 1Q 2020 to 4Q 2019
Changed CCS Increment III Risk Reduction start 2Q 2020 and extended to 2Q 2023.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305205N / *(U)UAS Integration and Interoperability*				Project (Number/Name) 3379 / *Common Control System*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
3379: *Common Control System*	63.745	20.848	24.663	42.315	-	42.315	66.056	60.571	43.067	40.761	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Common Control System (CCS) budget profile changes are due to program realignment to support CCS development and integration in support of MQ-25 Stingray, MQ-8 Fire Scout and follow on UxS platforms.

This PE funds the Unmanned Systems (UxSs) CCS. The primary mission of CCS is to provide common control across the Navy's UxSs portfolio to add scalable and adaptable warfighting capability, implement robust cybersecurity attributes, leverage existing government owned products, eliminate redundant software development efforts, consolidate product support, encourage innovation, improve cost control and enable rapid integration of UxS capabilities across Aviation, Surface, Sub-Surface, and Ground domains.

CCS is a ship/shore/airborne/expeditionary based common control system that provides Vehicle Management (VM) and Mission Management/Mission Planning (MM/MP) capabilities for Naval Group 1 through 5 Unmanned Air Vehicles (UAVs) as well as other domain UxSs. VM is the software that allows the operator to control the UxS. MM/MP is the software that allows the operator to create mission plans and control the UxS's sensors and payloads. CCS software is based on the Society of Automotive Engineers (SAE) Unmanned Control Segment (UCS) architecture which is a service oriented open architecture that is modular and scalable to meet evolving Service requirements and is also supportive of safety/airworthiness certification and cybersecurity certification and accreditation.

This program defines, develops, and delivers CCS capability that enables the flexibility for Ground Control Systems (GCS) that could be ship, shore, airborne, or expeditionary based to operate multiple and dissimilar Naval UxSs. CCS includes a common framework, user interface, and common components that will also be integrated and tested with legacy platform components. CCS is being developed with an open and modular business model with robust cybersecurity implementation and will be provided as Government Furnished Equipment (GFE) to UxS contractors as required.

The CCS acquisition approach provides increasing capability through incremental development for UxS platforms as follows:

Increment I delivered initial unmanned vehicle management (VM) functionality for MQ-25 Stingray in FY 2018, which included flight maneuvering and stationing, situational awareness, and health & performance status monitoring, hosted on legacy platform hardware. CCS VM functionality was delivered to MQ-8 Fire Scout in 1Q FY 2019 with another delivery scheduled for 3Q FY 2019.

Increment II builds upon CCS Increment I software delivery, adding discrete common MM/MP capabilities as well as maturing VM capabilities. These MM/MP capabilities include route planning, aerial refueling, sensor and payload control, and data processing and dissemination. CCS Increment II software will be hosted on legacy platform hardware. Increment II adds robust cybersecurity controls, key systems safety attributes and core program infrastructure, to include a system integration lab and

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305205N / *(U)UAS Integration and Interoperability*	**Project (Number/Name)** 3379 / *Common Control System*

software support activity (SSA). Additional efforts include developing and executing plans for integration of common CCS VM services already developed under this program into other UxS cross-domain platforms' control stations to reduce department-level Total Ownership Costs for unmanned Ground Control Systems.

Increment III provides common hardware for hosting CCS. CCS Increment III software will be developed and delivered with additional capabilities to include cross-domain capabilities and control of multiple dissimilar UxS for further enterprise-level Total Ownership Cost savings.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Increment I	9.781	3.013	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Common Control System (CCS) Increment 1 provides Unmanned System (UxS) Vehicle Management (VM) hosted on legacy platform hardware required to support UxSs control system development, integration and test. Initial platforms include MQ-25 Stingray and MQ-8 Fire Scout. ***FY 2019 Plans:*** Development of CCS VM capability under Increment I will be completed. Correction of deficiencies, software delivery, and platform integration and test support will continue in FY 2019. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** There is no funding in FY 2020 for Increment I as work completes in FY 2019. Maintenance of the VM capabilities as well as correction of deficiencies will be accomplished by the software support activity (SSA) which is captured under the Increment II work described below.					
Title: Increment II	11.067	21.650	40.446	0.000	40.446
Articles:	-	-	-	-	-
Description: CCS Increment II develops common MM/MP capabilities and updates and matures VM capabilities, integrating these capabilities into the core CCS software baseline delivered under Increment I in support of Naval UxSs. CCS Increment II is the future common control system software that provides maximum commonality for affordable transition to MQ-25 Stingray, MQ-8 Fire Scout, and other UxS to reduce enterprise Total Ownership Cost for UxS Ground Control Systems. Increment II also incorporates cyber security measures,					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305205N / *(U)UAS Integration and Interoperability*	**Project (Number/Name)** 3379 / *Common Control System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
key systems safety attributes, and core program infrastructure to include system integration lab and software support activities. ***FY 2019 Plans:*** CCS Increment II will begin initial software development incorporating results of requirements and architecture development efforts. Target platforms include: MQ-25 Stingray, MQ-8 Fire Scout and MQ-4 Triton but may be expanded to other UxS platforms. Increment II plans to develop and integrate cybersecurity software modules into the CCS software baseline. SSA efforts will continue, including support infrastructure for systems engineering, development, integration, test, correction of deficiencies, quality assurance, and cyber security compliance. Integration and test support for CCS platforms will continue. Advanced development and risk reduction efforts support future UxS integration and establishment of formal CCS software test capabilities. ***FY 2020 Base Plans:*** Development of common CCS mission management/mission planning capabilities continue. The SSA will continue to provide integrated software baselines to supported UxS platforms, correct identified deficiencies, ensure cyber security compliance, and support engineering/test/evaluation activities. CCS Increment II continues software common service development including the continued refinement of incremental common service releases for MQ-25 Stingray and MQ-8 Fire Scout which will support other future UxS platforms transitioning to CCS. Integration and test support for CCS platforms will continue. Advanced development and risk reduction efforts support future UxS integration and establishment of formal CCS software test capabilities. Follow-on efforts for SETA and SSA-Software Integration will initiate in FY 2020 to ensure there are no gaps in software support. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding increases from FY 2019 to FY 2020 covers work associated with adding a second contract action for further MM/MP common software service development.					
Title: Increment III	0.000	0.000	1.869	0.000	1.869
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305205N / *(U)UAS Integration and Interoperability*	**Project (Number/Name)** 3379 / *Common Control System*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Increment III provides common hardware for hosting CCS. CCS Increment III software will be developed and delivered with additional capabilities to include cross-domain capabilities and control of multiple dissimilar UxS for further enterprise-level Total Ownership Cost savings. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** Increment III efforts begin with studies and analyses. The studies/analyses includes identification of the overarching requirements, initiation of a draft Concept of Operations, potential hardware solutions, impacts to user training, and potential acquisition strategies. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding increases from FY2019 to FY2020 introduces funding to initiate studies and analyses associated with CCS Increment III.					
Accomplishments/Planned Programs Subtotals	20.848	24.663	42.315	0.000	42.315

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/4250: *Common Control System*	0.000	0.594	0.792	-	0.792	1.188	1.484	11.787	12.023	Continuing	Continuing

Remarks

D. Acquisition Strategy

Program Executive Office Unmanned Aviation and Weapon Systems (PEO(U&W)) issued an Acquisition Decision Memorandum (ADM) 5000 Ser PEO(U&W)/11-093 dated July 1, 2011 to establish the Common Control System (CCS) to achieve Unmanned Aircraft System (UAS) common control across PEO(U&W) UAS platforms to eliminate redundant efforts, encourage innovation and improve cost control of unmanned aviation. As directed by the ADM the program will define, develop and deliver a common control system to operate respective naval Unmanned Systems (UxS)s. This will include a common framework, a common user interface and common components that will be integrated and tested with unique components on emerging or legacy platforms. The CCS acquisition approach provides increasing UxS capability through incremental development for UxS platforms as follows: Increment I provided common Vehicle Management (VM) capability to MQ-25 Stingray and

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305205N / *(U)UAS Integration and Interoperability*	**Project (Number/Name)** 3379 / *Common Control System*

MQ-8 Fire Scout which can also support other UxSs. Increment II develops common MM/MP capabilities and updates and matures VM capabilities, integrating these capabilities into the core CCS software baseline delivered under Increment I in support of Naval UxSs. Increment III provides common hardware for hosting CCS. CCS Increment III software will be developed and delivered with additional capabilities to include cross-domain capabilities and control of multiple dissimilar UxS for further enterprise-level Total Ownership Cost savings. CCS was provided to the MQ-25 Stingray air vehicle prime as Government-Furnished Equipment (GFE) in FY 2018 and was also provided for transition to MQ-8 Fire Scout starting in FY2019. CCS will also be provided to additional follow-on UxS platforms to further reduce enterprise Total Ownership Cost for Ground Control Systems. CCS leverages existing government-owned products and will employ competitive procurement vehicles. ASN (RDA) designated CCS Increment II as an ACAT II program on December 1, 2017.

PEO(U&W) issued ADM 5000 Ser PEO(U&W)/18-119 dated September 11, 2018 approving the CCS Increment II Acquisition Strategy. PEO(U&W) issued ADM 5000 Ser PEO(U&W)/18-157 dated October 5, 2018 approving the CCS acquisition documentation tailoring and entry criteria for Increment II Milestone B.

E. Performance Metrics

CCS uses a Service-Oriented Architecture based on the Society of Automotive Engineers (SAE) Unmanned Control Segment (UCS) architecture. CCS provided analyses and documentation that supported the development of common requirements. CCS also inherits the applicable requirements of each supported UxS platform's CDD through the respective specification trees. CCS must therefore also support the Key Performance Parameters, Key System Attributes, Measures of Suitability/ Effectiveness, Concepts of Operations, etc., and concepts of operations flowed down from each supported platform.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305205N / *(U)UAS Integration and Interoperability*	**Project (Number/Name)** 3379 / *Common Control System*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Software Development (Increment I)	C/CPFF	Raytheon : Dulles, VA	31.946	9.781	Dec 2017	2.095	Jan 2019	0.000		-		0.000	0.000	43.822	43.822
Primary Software Development - Software Services (Increment II)	C/CPFF	TBD : TBD	0.000	0.000	May 2018	5.831	Feb 2019	16.023	Nov 2019	-		16.023	Continuing	Continuing	Continuing
Studies & Analysis (Increment III)	TBD	TBD : TBD	0.000	0.000		0.000		1.869	Jan 2020	-		1.869	Continuing	Continuing	Continuing
Advanced Development	WR	NAWC-WD : China Lake, CA	3.975	1.379	Nov 2017	1.925	Nov 2018	1.500	Nov 2019	-		1.500	Continuing	Continuing	Continuing
Software Cyber Modeling	C/CPFF	JHU APL : Baltimore, MD	2.000	0.000		0.000		2.100	Jan 2020	-		2.100	Continuing	Continuing	Continuing
Architecture Development	C/CPFF	SEI : Hanscom, MA	1.205	0.150	Nov 2017	0.000		0.000		-		0.000	0.000	1.355	1.355
Architecture Development	C/CPFF	NRL : Washington, DC	2.330	0.000		0.000		0.000		-		0.000	0.000	2.330	2.330
Architecture Development	Various	Various : Various	3.605	0.000	Feb 2018	0.000	Nov 2018	0.000	Nov 2019	-		0.000	0.000	3.605	3.605
SSA - Software Integration	C/CPFF	Raytheon : Dulles, VA	0.000	1.500	Feb 2018	5.628	Nov 2018	7.660	Nov 2019	-		7.660	Continuing	Continuing	Continuing
		Subtotal	45.061	12.810		15.479		29.152		-		29.152	Continuing	Continuing	N/A

Remarks

The FY 2020 Primary Software Development - Software Services (Increment II) contracts support the development of software services that will be incorporated into CCS. Separate competitive contracts for these software services will be awarded and incrementally funded. The performing activity and location are currently TBD because of the competitive contracting strategy. These contracting activities begin in FY 2019 and continue in to FY 2020. This contract activity increases due to multiple incrementally funded design, development, and integration efforts which include CCS Increment II v2.0 (originally started in FY 2019 and which continues throughout FY 2020), and the start in FY 2020 of CCS Increment II v2.1 analysis, design, and development efforts.

The FY 2020 SSA-Software Integration contract activity continues incremental funding for the SSA software integration contract efforts awarded via a competitive FY 2018 contract award. A follow-on SSA-Software Integration effort will initiate in FY 2020 to ensure there are no gaps in software support in FY 2021 and out. FY 2020 SSA - Software Integration supports integration efforts due to the development of additional Increment II common services supporting multiple platforms.

The FY 2020 Primary Software Development - Software Services (Increment III) accounts for Pre-Millstone A studies and analysis activities.

The FY20 Software Cyber Modeling reinstates previously deferred completion of the Integrated Cyber Model effort for cybersecurity protections.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305205N / *(U)UAS Integration and Interoperability*	Project (Number/Name) 3379 / *Common Control System*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	NAWC-AD : Pax River, MD	7.459	3.268	Nov 2017	3.713	Nov 2018	8.678	Nov 2019	-		8.678	Continuing	Continuing	Continuing
Lead Systems Engineering and Integration	WR	NAWC-WD : Pt Mugu, CA	2.995	0.000		0.000		0.000		-		0.000	0.000	2.995	2.995
Systems Engineering	C/CPFF	Engility : Pax River, MD	0.756	0.000		0.000		0.000		-		0.000	0.000	0.756	0.756
Systems Engineering Integration Test	C/CPFF	Booz Allen : Pax River, MD	2.714	0.000		0.000		0.000		-		0.000	0.000	2.714	2.714
Systems Engineering Study	C/CPFF	CNA : Alexandria, VA	0.800	0.000		0.000		0.000		-		0.000	0.000	0.800	0.800
Systems Engineering	Various	Various : Various	1.666	0.000		0.000		0.000		-		0.000	0.000	1.666	1.666
Systems Engineering Technical Agent	C/CPFF	DCS Corporation : Alexandria, VA	0.535	3.400	Feb 2018	2.905	Nov 2018	2.690	Nov 2019	-		2.690	Continuing	Continuing	Continuing
		Subtotal	16.925	6.668		6.618		11.368		-		11.368	Continuing	Continuing	N/A

Remarks

FY 2020 activities continue the development of the CCS architecture and requirements for future mission management/mission planning contract actions and supports the development of an increased number of CCS Increment II and Increment III common services. A follow-on Systems Engineering Technical Agent effort will initiate in FY 2020 to ensure no gaps in architecture and requirements development in FY 2021 and out.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DT&E/OT	WR	NAWC-AD : Pax River, MD	0.309	0.833	Nov 2017	1.966	Nov 2018	1.190	Nov 2019	-		1.190	Continuing	Continuing	Continuing
DT&E	WR	NAWC-WD : Pt Mugu, CA	0.730	0.000		0.000		0.000		-		0.000	0.000	0.730	0.730
		Subtotal	1.039	0.833		1.966		1.190		-		1.190	Continuing	Continuing	N/A

Remarks

FY 2020 Test and Evaluation efforts support DT/OT events for the integration and test of CCS Increment I and Increment II software for MQ-8 Fire Scout and MQ-25 Stingray.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305205N / *(U)UAS Integration and Interoperability*	**Project (Number/Name)** 3379 / *Common Control System*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	WR	NAWC-AD : Pax River, MD	0.670	0.334	Nov 2017	0.308	Nov 2018	0.410	Nov 2019	-		0.410	Continuing	Continuing	Continuing
Program Management Support	C/CPFF	Ausley Associates : Lexington Park, MD	0.050	0.203	Nov 2017	0.292	Nov 2018	0.195	Nov 2019	-		0.195	Continuing	Continuing	Continuing
		Subtotal	0.720	0.537		0.600		0.605		-		0.605	Continuing	Continuing	N/A

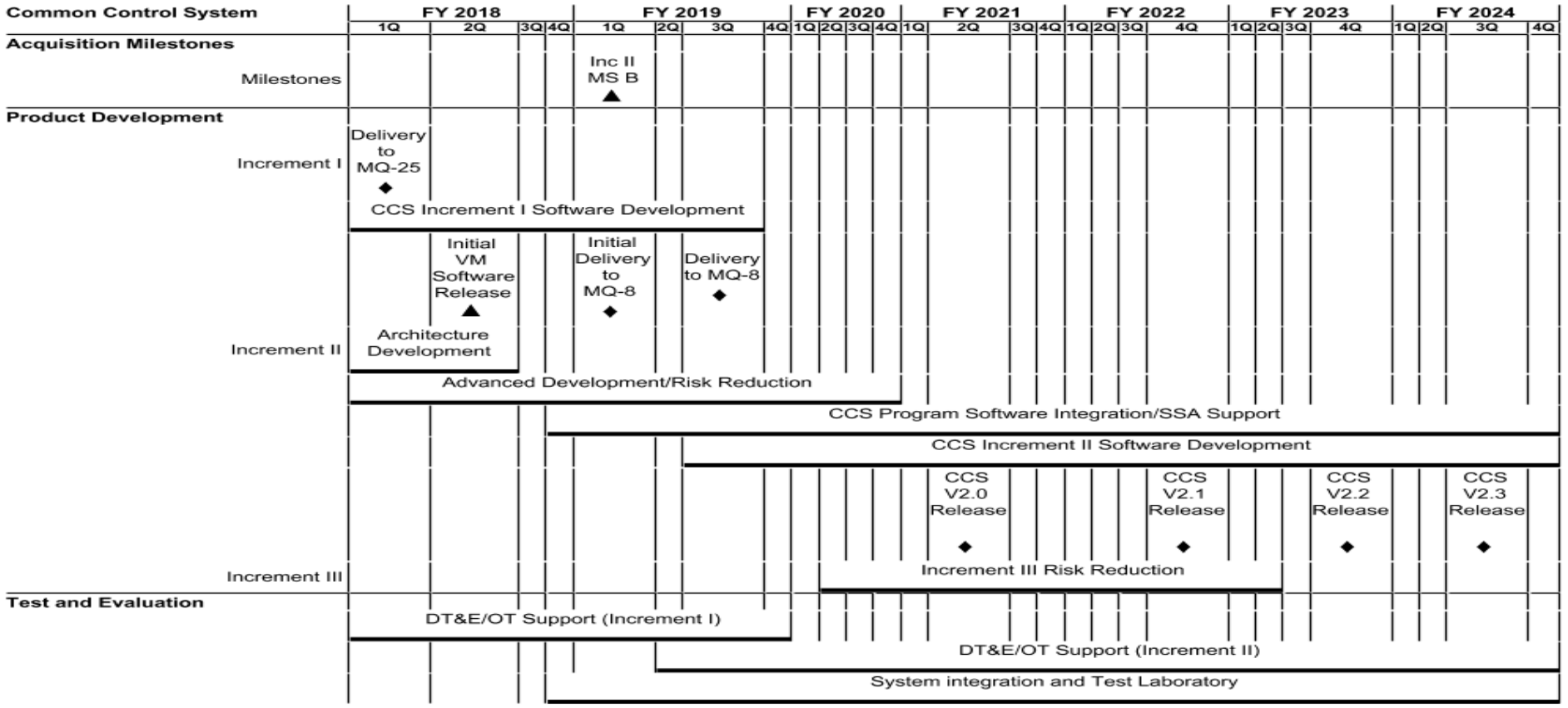
Remarks

Contractor support supporting multiple platforms in FY 2019 and FY 2020.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	63.745	20.848		24.663		42.315		-		42.315	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305205N / *(U)UAS Integration and Interoperability*	**Project (Number/Name)** 3379 / *Common Control System*



2020PB - 0305205N - 3379

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305205N / *(U)UAS Integration and Interoperability*	**Project (Number/Name)** 3379 / *Common Control System*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Common Control System				
Acquisition Milestones: Milestones: Inc II Milestone B	1	2019	1	2019
Product Development: Increment I: Delivery to MQ-25	1	2018	1	2018
Product Development: Increment I: CCS Increment I Software Development	1	2018	3	2019
Product Development: Increment I: CCS Increment I Initial VM Software Release	2	2018	2	2018
Product Development: Increment I: Initial Delivery to MQ-8	1	2019	1	2019
Product Development: Increment I: Delivery to MQ-8	3	2019	3	2019
Product Development: Increment II: Architecture Development	1	2018	2	2018
Product Development: Increment II: Advanced Development/Risk Reduction	1	2018	4	2020
Product Development: Increment II: CCS Program Software Integration/SSA Support	4	2018	4	2024
Product Development: Increment II: CCS Increment II Software Development	3	2019	4	2024
Product Development: Increment II: CCS V2.0 Release	2	2021	2	2021
Product Development: Increment II: CCS V2.1 Release	4	2022	4	2022
Product Development: Increment II: CCS V2.2 Release	4	2023	4	2023
Product Development: Increment II: CCS V2.3 Release	3	2024	3	2024
Product Development: Increment III: Increment III Risk Reduction	2	2020	2	2023
Test and Evaluation: DT&E/OT Support (Increment I)	1	2018	4	2019
Test and Evaluation: DT&E/OT Support (Increment II)	2	2019	4	2024
Test and Evaluation: System Integration and Test Laboratory	4	2018	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305208M *I (U)Distributed Common Ground/Surface Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	72.376	13.338	7.610	22.042	-	22.042	17.019	17.447	18.073	18.463	Continuing	Continuing
2268: *Distributed Common Ground System (DCGS-MC)*	72.376	13.338	7.610	22.042	-	22.042	17.019	17.447	18.073	18.463	Continuing	Continuing

Note

Beginning in FY20, Intelligence Analysis System (IAS) and Technical Control Analysis Center (TCAC) resources have been realigned from PE 0206625M project 2272, Intel Command and Control (C2) Sys to PE 0305208M project 2268, Distributed Common Ground/Surface Systems. Transition into the DCGS portfolio is necessary to concentrate investments in an integrated architecture thereby improving DCGS Enterprise alignment and more effectively leveraging the rapid integration of new technology.

A. Mission Description and Budget Item Justification

This is a Military Intelligence Program program element.

Distributed Common Ground/Surface System Marine Corps (DCGS-MC) is integral to delivering decision advantage at the speed of operational relevance. In order to concentrate investments in an integrated architecture to improve enterprise alignment while delivering substantially better collective intelligence outcomes for the warfighter, our All-Source and SIGINT programs have been consolidated under the DCGS-MC portfolio.

DCGS-MC provides core intelligence processing, analysis, production, and dissemination tools within garrison and deployed Marine Corps organizations. DCGS-MC complies with the Department of Defense (DoD) DCGS Enterprise interoperability and information sharing requirements by migrating select processing, exploitation, analysis, and production capabilities into a single, integrated, net-centric baseline within the Marine Corps Intelligence, Surveillance and Reconnaissance Enterprise (MCISRE). Capabilities are provided via COTS servers, workstations, laptops, peripherals, and commercial and government software. Modernization and technology insertion efforts are focused on advanced capabilities such as cloud services and Artificial Intelligence/ Machine learning (AI/ML) to support operations in the information environment. Current programmatic efforts support a service-oriented architecture and migration to common hardware and software to take advantage of common computer administration functions, common training, and common cybersecurity procedures.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305208M *I (U)Distributed Common Ground/Surface Systems*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	12.867	7.687	9.065	-	9.065
Current President's Budget	13.338	7.610	22.042	-	22.042
Total Adjustments	0.471	-0.077	12.977	-	12.977
• Congressional General Reductions	-	-0.077			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.472	0.000			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	12.966	-	12.966
• Rate/Misc Adjustments	0.000	0.000	0.011	-	0.011
• Congressional General Reductions Adjustments	-0.001	-	-	-	-

Change Summary Explanation

The increase of $14.432M between FY19 and FY20 is attributed to 1) the realignment of IAS and TCAC resources from PE 0206625M USMC Intelligence/ Electronics Warfare Systems to the DCGS-MC portfolio and 2) increased Project Maven and Artificial Intelligence efforts to include integration, hardware/software accreditation to extend services to JWICS and other security domains/networks, and enabling reach back to Processing, Exploitation, and Dissemination (PED).

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	Project (Number/Name) 2268 / *Distributed Common Ground System (DCGS-MC)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2268: *Distributed Common Ground System (DCGS-MC)*	72.376	13.338	7.610	22.042	-	22.042	17.019	17.447	18.073	18.463	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This is a Military Intelligence Program program element.

Distributed Common Ground/Surface System Marine Corps (DCGS-MC) is integral to delivering decision advantage at the speed of operational relevance outlined in the 2018 National Defense Strategy. In order to concentrate investments in an integrated architecture to improve enterprise alignment while delivering substantially better collective intelligence outcomes for the warfighter, our All-Source and SIGINT programs have been consolidated under the DCGS-MC portfolio. DCGS-MC provides an analysis and production capability within garrison and deployed Marine Corps organizations. DCGS-MC complies with the Department of Defense (DoD) DCGS Enterprise interoperability and information sharing requirements by migrating select processing, exploitation, analysis, and production capabilities into a single, integrated, net-centric baseline within the Marine Corps Intelligence, Surveillance and Reconnaissance Enterprise (MCISRE). This baseline will enable MCISRE analysts to deliver tactically focused, operational and strategic intelligence at the tactical edge throughout all phases of operations and will provide relevant, precise decision support for Joint Task Force (JTF), Marine Air Ground Task Force (MAGTF), and subordinate Marine units. The DCGS-MC portfolio currently consists of enterprise services and functional analytic and production tools that provide analysts with the ability to process, disseminate, exploit, analyze, and produce intelligence for discovery via the DCGS Integration Backbone (DIB). The Functional capabilities are grouped by DCGS-MC GEOINT, DCGS-MC All-Source, and DCGS-MC SIGINT. Future capabilities will be delivered via clearly defined Capability Drops determined by an integrated assessment of user needs, technology readiness, risk mitigation, and affordability.

DCGS-MC Geospatial Intelligence (DCGS-MC GEOINT)

The Geospatial Intelligence (GEOINT) provides geo-referenced data and products that establish the GEOINT foundation for battlespace visualization and a common frame of reference to support the commander's decision making process. It enables the ability to rapidly respond to, or predict, threats around the world by providing near real time geospatially referenced data and products that serve as the Authoritative Data Source for the full spectrum of Marine Air-Ground Task Force (MAGTF), joint, and multinational partners operations. DCGS-MC GEOINT enables mission accomplishment across the range of military operations and with all mission partners. The DCGS-MC GEOINT provides the tasking, collection, processing, exploitation, analysis, production, storage, and dissemination of imagery and geospatial information to describe, assess, produce, and visually depict physical features and geographically referenced activities on the Earth. DCGS-MC GEOINT will incorporate those capabilities formally provided by the Tactical Exploitation Group, Topographic Production Capability, Virtual Imagery Processing - Marine Corps, and Target Materials Production legacy systems.

DCGS-MC ALL SOURCE

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

The Intelligence Analysis System (IAS) Family of System (FoS) is the DCGS-MC All-Source Fusion Center that provides interoperable, scalable, semi-automated capabilities to receive, analyze, display, and disseminate all-source intelligence, including imagery, to support timely, tactical decision-making across the MAGTF.

DCGS-MC Signal Intelligence (DCGS-MC SIGINT)

The Technical Control Analysis Center (TCAC) FoS consists of the TCAC Remote Analysis Workstation (RAWS), the Transportable Workstation (TWS) and the Cross Domain Solution (CDS), and is the focal point of Radio Battalions (RADBN), Marine Corps Forces Special Operations Command (MARFORSOC), and Joint Strike Fighter (JSF) Signal Intelligence (SIGINT) operations. TCAC automatically collects, stores, retrieves and plays back digital audio signals, and fuses and analyzes SIGINT data from tactical, theater and national collectors and databases for dissemination to tactical commanders. TCAC provides SIGINT analysis applications to deployable MAGTF units capable of directing and managing the technical and operational functions of other RADBN SIGINT/EW assets. Additionally, TCAC provides a focal point for national, theater and tactical data networks for data exchange with tactical SIGINT/EW assets, the IAS and national databases. TCAC will enable the transfer of USMC tactical SIGINT collection and analytical data into the Real-Time Regional Gateway (RT-RG) and by producing DIB enabled products that will be discoverable by any DCGS enabled Marine. The system provides ground processing of Electronic Warfare (EW) information, including EW Support and Electronic Attack (EA) data collected by the RADBN and JSF aircraft. The Cross Domain Solution will also enable the TCAC to transfer approved and sanitized file types from Top Secret/Sensitive Compartmented Information (TS/SCI) networks (e.g. JWICS/NSAnet) to Marine Corps Enterprise Network-SIPR (MCEN-S) networks for delivery to Tactical Commanders.

The overall increase of $14.432M is primarily due to the realignment of TCAC and IAS resources to DCGS-MC. This concentrates investments in an integrated architecture thereby improving DCGS Enterprise alignment and more effectively leveraging the rapid integration of new technology.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: DCGS-MC GEOINT: Product Development	4.035	2.221	5.237	0.000	5.237
Articles:	-	-	-	-	-
FY 2019 Plans: - Initiate support for research and development activities to consolidate software and hardware for common GEOINT servers and workstations. -Initiate support for research and development activities to integrate the Enterprise Hub (EHUB) into DCGS-MC. The EHUB will provide infrastructure and services for computing, networking, and storage that can be provisioned and shared virtually over networks across the MCISRE. - Initiate Common GEOINT Baseline hardware and software accreditation efforts to extend services to JWICS and other security domains/networks (MCEN-NIPR, Domain reciprocity, Virtual Machine Accreditation, Centrix, etc) to enable increased data discovery and dissemination of Marine Corps intelligence.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiate expanded Processing, Exploitation, and Dissemination (PED) reach-back capability to accommodate FMV/GEOINT exploitation in support of tactical intelligence analysts operating in a Disconnected, Intermittent, Limited bandwidth (D-DIL) environment. - Continue support for program ECPs as necessary. - Continue support for DCGS-MC GEOINT software enhancements as identified through configuration control board and engineering review boards in response to OPFOR requirements. - Continue support for research and development activities to integrate ASF capability into DCGS-MC. - Continue support for research and development activities to integrate SIGINT capability into DCGS-MC. - Complete DCGS-MC GEOINT support for software integration of applications such as ArcGIS Portal, iSTORE, CJMTK, and ENVI. ***FY 2020 Base Plans:*** - Initiate support for Project Maven/Artificial Intelligence (AI) integration into Common GEOINT Baseline. - Continue support for JWICS and NIPR domain integration efforts for Common GEOINT Baseline. - Continue support for program ECPs as necessary. - Continue support for DCGS-MC GEOINT software enhancements as identified through configuration control board and engineering review boards in response to OPFOR requirements. - Continue support for research and development activities to integrate garrison EHUB into DCGS-MC. - Continue support for research and development activities to consolidate software and hardware for common GEOINT servers and workstations. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase of $3.016M from FY19 to FY20 supports efforts to integrate Maven/AI into the DCGS-MC POR, additional hardware/software accreditation efforts extending services to JWICS and other security domains/ networks, and reach back development efforts required under DCGS-MC GEOINT.					
Title: DCGS-MC GEOINT: Support	0.750	0.875	0.900	0.000	0.900
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue support for systems engineering, interoperability analysis, acquisition planning, and systems integration.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Initiate support for Project Maven integration planning, data analytics and cloud services capabilities. ***FY 2020 Base Plans:*** - Continue support for Project Maven integration planning, data analytics and cloud services capabilities. - Continue support for systems engineering, interoperability analysis, acquisition planning, and systems integration ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** No significant change from FY 2019 to FY 2020.					
Title: DCGS-MC GEOINT: Test and Evaluation	8.151	4.214	3.692	0.000	3.692
Articles:	-	-	-	-	-
FY 2019 Plans: -Continues Post Milestone C SETR activities associated with DCGS-MC Capability Drops, software integration and associated test events. -Continues test efforts in support of commonality of HW/SW baselines across Common GEOINT systems, such as DCGS-MC, VIP-MC, TEG-RWS and TPC. -Continues Cyber Security Test Events to maintain system security postures. -Continues integration and interoperability testing of a JWICS SIPRNet CDS that will be part of the DCGS portfolio Authorized Acquisition Objective and facilitate the ability to share higher level intelligence to a broader audience for analysis and action. -Continues test events associated with GEOINT and Imagery hardware refresh -Continues software and hardware consolidation studies to support the development of the Common GEOINT Server and Common Workstation. -Continues software development efforts to provide enhanced software capabilities within the current EDS System baseline. -Initiates integration of EHUB capability into DCGS-MC. -Initiates integration of ASF capability into DCGS-MC. -Initiates integration of SIGINT capability into DCGS-MC. ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue Post Milestone C SETR activities associated with DCGS-MC Capability Drops, software integration and associated test events. - Continue support for systems engineering, interoperability analysis, acquisition planning, and systems integration - Continue support for research and development activities that impact the acquisition of military intelligence, surveillance, and reconnaissance systems. - Continue requirements traceability efforts for all DCGS-MC programs, including Key Performance Parameters and Key System Attributes to ensure fielded systems or systems under development meet/continue to meet systems and sub-systems specifications and requirements, providing materiel solutions which meet operational requirements, verified through appropriate developmental and operational test events. - Continue GEOINT systems requirements review and support for GEOINT software enhancements, leveraging the DCGS Mission Execution Team Office and DCGS-MC Configuration Control Board to refine and integrate system requirements through the RDP in order to deliver GEOINT capabilities that keep pace with technology and meet OPFOR requirements - Continue support for research and development activities to integrate ASF capability into DCGS-MC. - Continue support for research and development activities to integrate SIGINT capability into DCGS-MC. - Continue support for research and development activities to integrate Enterprise Services into DCGS-MC (EHub). - Continue support for software and hardware consolidation development and integration activities associated with DCGS-MC GEOINT efforts which will reduce the overall GEOINT hardware footprint, while combining legacy capabilities into a single baseline, providing a more flexible Geospatial, Full Motion Video, Imagery and Target Material Production workstation/suite of equipment. - Continue support for integration and testing of advanced analytics tools and AI/ML into the software baseline. - Initiate support for JWICS and NIPR domain integration efforts for Common GEOINT Baseline to allow for increase data discovery and dissemination of Marine Corps intelligence - Initiate support for expanded Processing, Exploitation, and Dissemination (PED) reach-back capability to accommodate FMV/GEOINT exploitation in support of tactical intelligence analysts operating in a Disconnected, Intermittent, Limited bandwidth (D-DIL) environment.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The decrease of $.522M from FY19 to FY20 supports the DCGS GEOINT baseline consolidation efforts.					
Title: DCGS-MC GEOINT: Management Services	0.402	0.300	0.309	0.000	0.309
Articles:	-	-	-	-	-
FY 2019 Plans: - Continue support for research and development activities that impact the acquisition of military intelligence, surveillance, and reconnaissance systems. - Continue support for systems engineering, interoperability analysis, acquisition planning, and systems integration expertise. - Continue support for program ECPs as necessary. - Initiate support for research and development activities to integrate garrison EHUB into DCGS-MC. - Initiate support for research and development activities to consolidate software and hardware for common GEOINT servers and workstations. - Complete DCGS-MC GEOINT support for software integration of applications such as ArcGIS Portal, iSTORE, CJMTK, and ENVI. - Complete support for research and development activities to integrate ASF capability into DCGS-MC. - Complete support for research and development activities to integrate SIGINT capability into DCGS-MC.					
FY 2020 Base Plans: - Continue support for research and development activities that impact the acquisition of military intelligence, surveillance, and reconnaissance systems.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: No significant change from FY 2019 to FY 2020.					
Title: DCGS-MC All Source: Product Development	0.000	0.000	3.480	0.000	3.480
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: - Continue integration, system testing, and evaluation of Intelligence Servers into the IAS FoS.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue integration, system testing, and evaluation of advanced analytic technologies into the Intelligence Analysis System (IAS) Family of Systems (FoS). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The IAS program was previously funded in PE 0206625M, Project 2272 in FY19 and prior. Decrease of $0.425M from FY19 (PE 0206625M, Project 2272 $3.905M) to FY20 reflects the completion of the DCGS Integrated Backbone into the IAS FoS.					
Title: DCGS-MC All Source: Test and Evaluation	0.000	0.000	1.936	0.000	1.936
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:*** - Continue support for integration of advanced analytics tools into the IAS FoS software baseline. - Continue support for integration and testing of Intelligence Servers into the IAS FoS. - Continue testing and evaluation for the Cross Domain Solution. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The IAS program was previously funded in PE 0206625M, Project 2272 in FY19 and prior. Increase of $0.236M from FY19 (PE 0206625M, Project 2272 $1.700M) to FY 20 reflects the continuation of testing and evaluation for the Cross Domain Solution.					
Title: DCGS-MC All Source: Management Services	0.000	0.000	0.300	0.000	0.300
Articles:	-	-	-	-	-
FY 2019 Plans: N/A ***FY 2020 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue program management support for integration of advanced analytics tools into the IAS FoS software baseline. - Continue program management support for integration and testing of Intelligence Servers into the IAS FoS. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The IAS program was previously funded in PE 0206625M, Project 2272 in FY19 and prior. Decrease of $0.267M from FY19 (PE 0206625M, Project 2272 $0.567M) to FY20 reflects the completion of the DCGS Integrated Backbone into the IAS FoS.					
Title: DCGS-MC SIGINT: Test and Evaluation ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** -Complete final developmental testing events before fielding decision for the RAWS -Complete research and testing for the TWS technical research to finalize decision for product procurement. -Continue test design in support of the next hardware refresh for RAWS and CDS. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The TCAC program was previously funded in PE 0206625M project 2272 in FY19 and prior. Decreased of $.318M from FY19 (PE 0206625M project 2272 $2.534M) to FY20 reflects the completion of research and test design in support of next hardware refresh/TCAC FoS capability enhancements.	0.000 -	0.000 -	2.216 -	0.000 -	2.216 -
Title: DCGS-MC SIGINT: Product Development ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** -Complete product development for the TWS hardware refresh in order to conduct testing and evaluation events.	0.000 -	0.000 -	2.928 -	0.000 -	2.928 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Continue research in support of next CDS hardware refresh. -Complete research and development for RAWS. -Initiate integration of AI/ML components for FoS. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The TCAC program was previously funded in PE 0206625M project 2272 in FY19 and prior. Decrease of $.587M from FY19 (PE 0206625M $3.515) to FY20 reflects completion of system development and system design for JICD 4.2 and TWS software baseline.					
Title: DCGS-MC SIGINT: Support ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** -Continue technical support of improvement to TCAC software baseline based on the Secure the Enterprise/ Secure the Network infinitives required by NSA for network connectivity. -Continue technical support for the next hardware refresh for each component of the FoS. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The TCAC program was previously funded in PE 0206625M project 2272 in FY19 and prior. Increase of $.753M from FY19 (PE 0206625M project 2272 $.291M) to FY20 supports the technical support of improvements to TCAC baseline and for next TCAC hardware refresh/TCAC FoS capability enhancements.	0.000 -	0.000 -	1.044 -	0.000 -	1.044 -
Accomplishments/Planned Programs Subtotals	13.338	7.610	22.042	0.000	22.042

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/47671: *DCGS-MC GEOINT*	12.883	16.081	20.516	-	20.516	19.000	16.560	17.860	20.626	Continuing	Continuing
• PMC/47672: *DCGS-MC All Source*	0.000	0.000	0.000	7.770	7.770	11.165	8.210	8.375	8.542	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/47673: *DCGS-MC SIGINT*	0.000	0.000	0.000	4.276	4.276	4.262	2.853	2.938	2.997	Continuing	Continuing
• PMC/70001: *DCGS-MC All Source Spares*	0.000	0.000	0.166	-	0.166	0.169	0.172	0.176	0.180	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Acquisition Strategy shall follow a hybrid approach consisting of a viable mix of alternatives that allows flexibility, agility and rapid fielding of new capabilities. An evolutionary acquisition approach will provide users with time-phased increments of capabilities that (while less than the full requirement), promote earlier delivery, improve affordability, and reduce risk. The evolutionary approach enables DCGS-MC to effectively assess and leverage emerging technologies to accelerate introduction into MCISRE. The DCGS-MC capabilities will be fielded in increments through operational capability drops.

E. Performance Metrics

-Quarterly Dashboard Input
-IOC

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	Project (Number/Name) 2268 / *Distributed Common Ground System (DCGS-MC)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DCGS-MC GEOINT	C/CPFF	SSCA : Charleston, SC	0.000	1.785	Mar 2018	1.068	Dec 2018	2.422	Feb 2020	-		2.422	Continuing	Continuing	Continuing
DCGS-MC GEOINT - Classified Services	Various	N/A : N/A	0.000	2.250	Jun 2018	1.153	Mar 2019	2.815	Mar 2020	-		2.815	Continuing	Continuing	Continuing
DCGS-MC All Source - GOVT	WR	SSCA : Charleston, SC	0.000	0.000		0.000		1.800	Jan 2020	-		1.800	Continuing	Continuing	Continuing
DCGS-MC All Source	C/CPFF	SSCA : Charleston, SC	0.000	0.000		0.000		1.680	Feb 2020	-		1.680	Continuing	Continuing	Continuing
DCGS-MC SIGINT	C/CPFF	SSCA : Charleston, SC	0.000	0.000		0.000		1.728	Dec 2019	-		1.728	Continuing	Continuing	Continuing
DCGS-MC SIGINT	MIPR	DTIC : Ft. Belvoir, VA	0.000	0.000		0.000		1.200	Dec 2019	-		1.200	Continuing	Continuing	Continuing
DCGS PRIOR YEAR CUMULATIVE FUNDING	Various	N/A : N/A	55.765	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	55.765	4.035		2.221		11.645		-		11.645	Continuing	Continuing	N/A

Remarks

$6.408M of the increase from FY19 to FY20 in Product Development is attributed to the realignment of IAS and TCAC resources to the DCGS-MC portfolio as indicated in the R2A. An additional increase of $3.016M in FY20 supports efforts to integrate Maven/AI into the DCGS-MC POR, additional hardware/software accreditation efforts extending services to JWICS and other security domains/networks, and reach back development efforts required under DCGS-MC GEOINT.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DCGS-MC GEOINT	C/CPFF	SSCA1 : Charleston, SC	0.000	0.750	Mar 2018	0.875	Mar 2019	0.900	Mar 2020	-		0.900	Continuing	Continuing	Continuing
DCGS PRIOR YEAR CUMULATIVE FUNDING	Various	N/A : N/A	7.341	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
DCGS-MC SIGINT	C/CPFF	DTIC : Ft. Belvoir, VA	0.000	0.000		0.000		1.044	Jun 2020	-		1.044	Continuing	Continuing	Continuing
		Subtotal	7.341	0.750		0.875		1.944		-		1.944	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	Project (Number/Name) 2268 / *Distributed Common Ground System (DCGS-MC)*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Increase from FY19 to FY20 in Test and Evaluation is attributed to the realignment of IAS and TCAC resources to the DCGS-MC portfolio as indicated in the R2A.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DCGS- MC GEOINT	Various	SSCA : Charleston, SC	1.593	2.390	May 2018	1.545	Dec 2018	1.500	Jun 2020	-		1.500	Continuing	Continuing	Continuing
DCGS-MC GEOINT	Various	NSWC Crane : Crane, IN	0.000	0.000		0.400	Nov 2018	0.000		-		0.000	Continuing	Continuing	Continuing
DCGS-MC GEOINT	WR	NSMA : Washington DC	0.300	0.354	Jun 2018	0.300	Aug 2019	0.375	Dec 2019	-		0.375	Continuing	Continuing	Continuing
DCGS-MC GEOINT	C/CPFF	SSCA : Charleston, SC	1.589	2.701	Jan 2018	1.969	Dec 2018	0.612	Jan 2020	-		0.612	Continuing	Continuing	Continuing
DCGS-MC GEOINT	C/CPFF	NRL : Washington, DC	1.202	2.706	May 2018	0.000		1.205	May 2020	-		1.205	Continuing	Continuing	Continuing
DCGS-MC All Source	C/CPFF	SSCA : Not Specified	0.000	0.000		0.000		1.936	Jun 2020	-		1.936	Continuing	Continuing	Continuing
DCGS-MC SIGINT	WR	SSCA : Charleston, SC	0.000	0.000		0.000		0.841	Feb 2020	-		0.841	Continuing	Continuing	Continuing
DCGS-MC SIGINT	MIPR	DTIC : Ft. Belvoir, VA	0.000	0.000		0.000		1.375	Jun 2020	-		1.375	Continuing	Continuing	Continuing
DCGS PRIOR YEAR CUMULATIVE FUNDING	Various	N/A : N/A	4.586	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	9.270	8.151		4.214		7.844		-		7.844	Continuing	Continuing	N/A

Remarks

Increase from FY19 to FY20 in Test and Evaluation is attributed to the realignment of IAS and TCAC resources to the DCGS-MC portfolio as indicated in the R2A.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DCGS-MC GEOINT: MITRE	C/CPFF	CECOM : APG, MD	0.000	0.402	Nov 2017	0.300	Nov 2018	0.309	Nov 2019	-		0.309	Continuing	Continuing	Continuing
DCGS-MC All Source	C/FFP	DTIC : Ft. Belvoir, VA	0.000	0.000		0.000		0.300	Apr 2020	-		0.300	Continuing	Continuing	Continuing
		Subtotal	0.000	0.402		0.300		0.609		-		0.609	Continuing	Continuing	N/A

Remarks

Increase from FY19 to FY20 in Management Services is attributed to the realignment of IAS and TCAC resources to the DCGS-MC portfolio as indicated in the R2A.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	72.376	13.338		7.610		22.042		-		22.042	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

DCGS-MC All Source Program Schedule

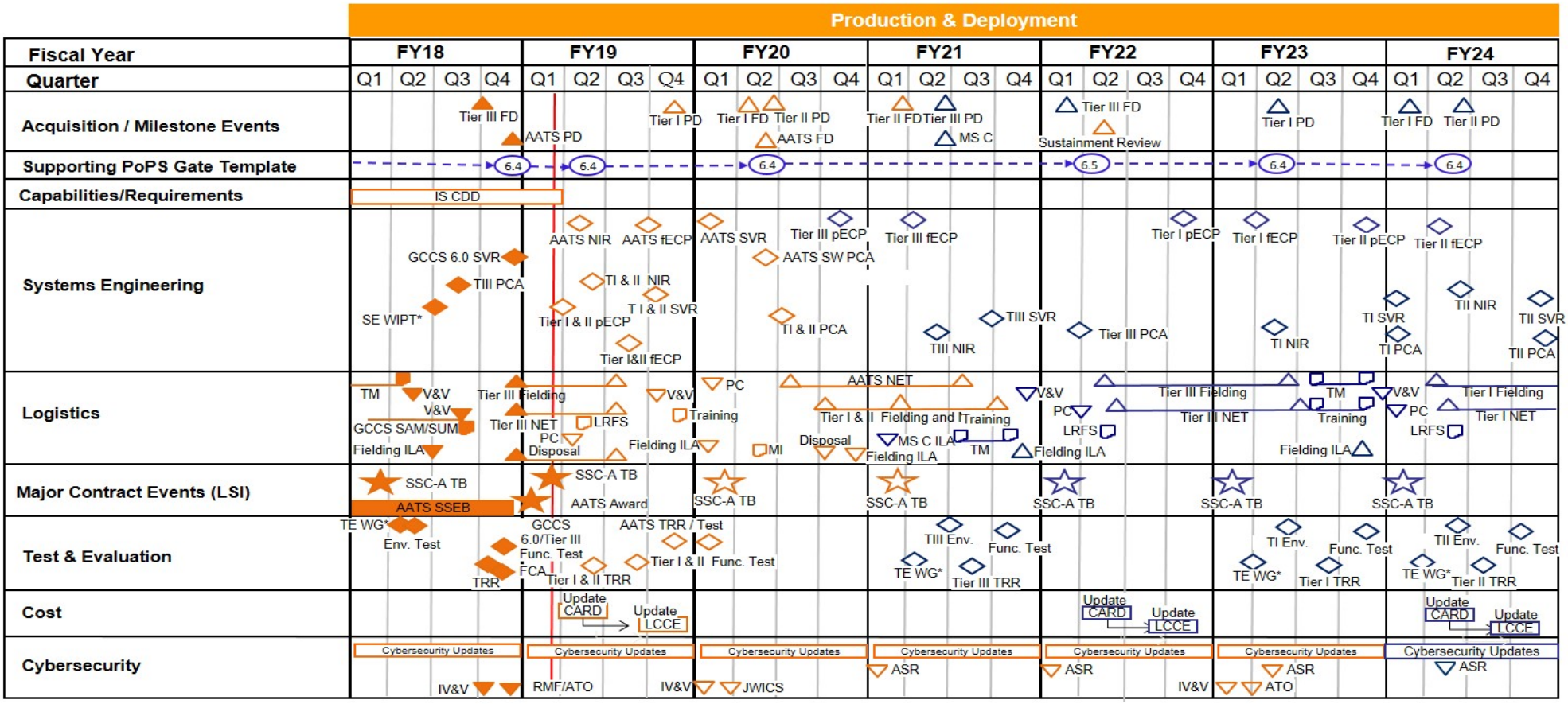

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

DCGS-MC SIGINT Program Schedule

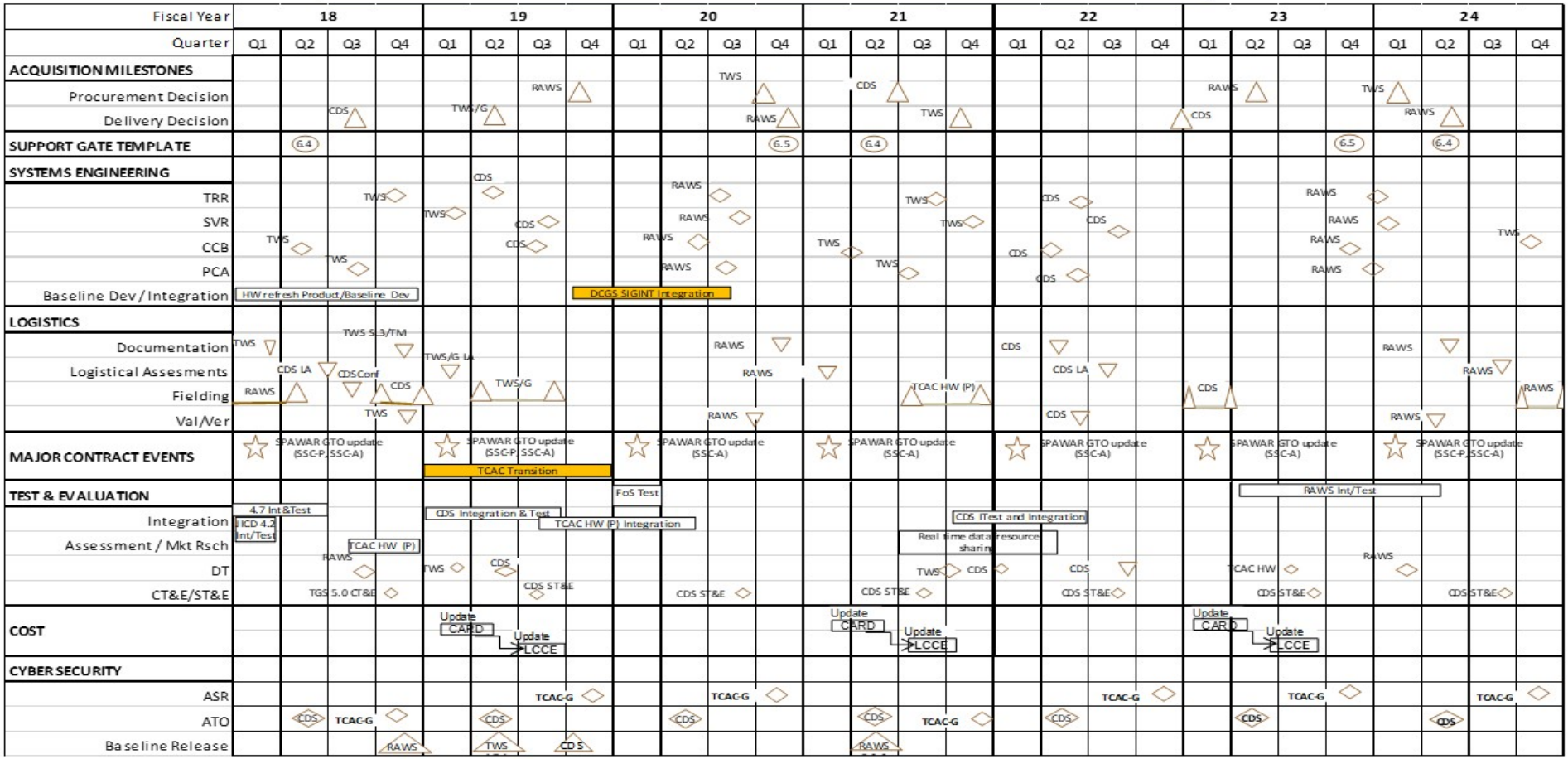

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

DCGS-MC GEOINT Program Schedule

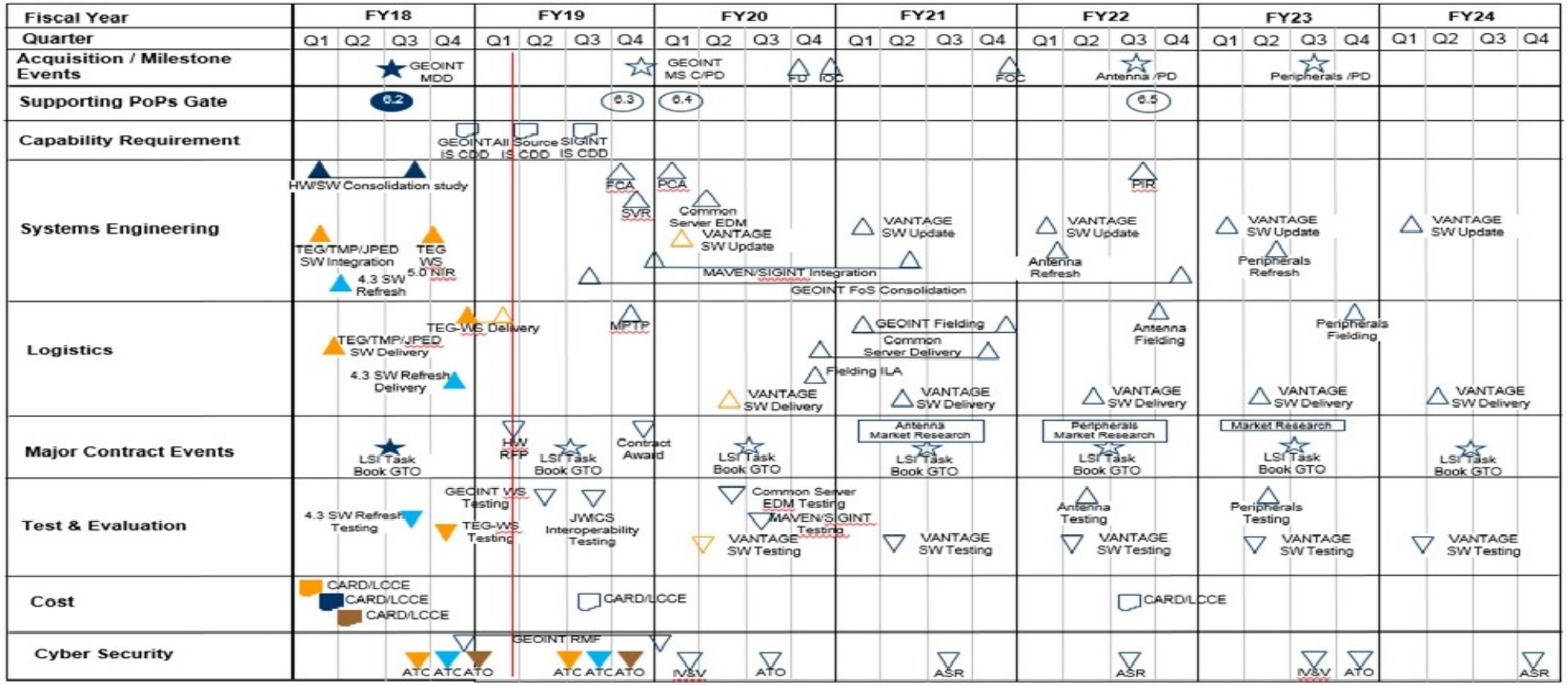

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208M / *(U)Distributed Common Ground/Surface Systems*	**Project (Number/Name)** 2268 / *Distributed Common Ground System (DCGS-MC)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2268				
DCGS-MC GEOINT: GEOINT Common Server Testing	2	2020	2	2020
DCGS-MC GEOINT: JWICS/CDS Interoperability Testing	3	2019	3	2019
DCGS-MC GEOINT: GEOINT MS C FRP	4	2019	4	2019
DCGS-MC GEOINT: Maven Integration	4	2019	2	2021
DCGS-MC GEOINT: GEOINT Fielding Decision	4	2020	4	2020
DCGS-MC GEOINT: GEOINT IOC	4	2020	4	2020
DCGS-MC GEOINT: Common Server Delivery	4	2020	4	2021
DCGS-MC All Source: TIER I Fielding Decision	2	2020	2	2020
DCGS-MC All Source: TIER II Procurement Decision	2	2020	2	2020
DCGS-MC All Source: AATS Fielding Decision	2	2020	2	2020
DCGS-MC SIGINT: TWS Procurement Decision	4	2020	4	2020
DCGS-MC SIGINT: RAWS Delivery Decision	4	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305208N *I Distributed Common Ground Sys*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	271.194	40.150	42.846	0.000	-	0.000	0.000	0.000	0.000	0.000	130.708	484.898
2174: *Distributed Common Ground System-Navy (DCGS-N)*	206.841	0.325	0.222	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	207.388
2227: *Distributed Common Ground System (DCGS-N) Inc 2*	64.353	39.825	42.624	0.000	-	0.000	0.000	0.000	0.000	0.000	130.708	277.510
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** MN40, M464												

Note

Funding for the following projects has been realigned out of PE 0305208N into PE 0304785N as part of Program Element Consolidation starting in FY20: Project 2174 (Distributed Common Ground System-Navy (DCGS-N) and Project 2227 (DCGS-N Increment 2).

A. Mission Description and Budget Item Justification

The Distributed Common Ground System - Navy (DCGS-N) is the Navy's portion of the Under Secretary of Defense, Intelligence (USD (I)) DCGS Family of Systems (FoS). The Department of Defense (DoD) has defined a DCGS architecture that will be compatible and interoperable across all of the Services' Intelligence, Surveillance and Reconnaissance (ISR) systems and operations. DCGS accesses and ingests data from spaceborne, airborne, subsurface, and surface ISR collection assets, intelligence databases and intelligence producers. This collected data is shared across a joint enterprise using the DCGS Integration Backbone (DIB) and in time, the Defense Intelligence Information Enterprise (DI2E) to enhance access and sharing of ISR information across Joint forces through the use of common enterprise standards and services. DCGS FoS supports Joint Task Force (JTF)-level and below combat operations with critical intelligence for battle management and information dominance across the full spectrum of operations, including peace, conflict, war, and Overseas Contingency Operations (OCO). DCGS is a cooperative effort between the services, agencies, and DoD to provide systems capable of receiving, processing, exploiting, and disseminating data from airborne and national reconnaissance platforms. DCGS-N core components include the analyst workstation from the Global Command and Control System (GCCS) - Integrated Imagery and Intelligence (I3), Generic Area Limitation Environment (GALE) Signals Intelligence (SIGINT), Common Geo-positioning Services (CGS), Image Product Library (IPL) or Information Store (iSToRE), Modernized Integrated Database (MIDB), Joint Concentrator Architecture (JCA) and Track Management Services (TMS).

The DCGS-N system represents the integration of 1) The processing and exploitation of tactical and Imagery Intelligence (IMINT) and SIGINT; 2) Precision target geopositioning, mensuration, and imagery dissemination capabilities; 3) Selected national IMINT requirements and processing capabilities from the National Geospatial-Intelligence Agency (NGA); and 4) Sharing of Intelligence, Surveillance, Reconnaissance and Targeting (ISR&T) and Command and Control information via DIB, DI2E, and Net-Centric Enterprise Services (NCES) standards with a wide range of customers (e.g., Global Command and Control System - Maritime (GCCS-M), Joint Mission Planning System (JMPS), and many others). The DCGS-N system efforts include investigation of emerging technologies through study, development, and associated testing for feasibility of program insertion.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305208N *I Distributed Common Ground Sys*

The DCGS-N Enterprise Node (DEN), which incorporates current DIB standards and DI2E policy, facilitates interoperability and data sharing among the DCGS FoS. DCGS-N ensures compliance with the DoD DCGS network architecture.

The Navy is establishing an ISR Enterprise way ahead that will emphasize a reach back strategy to provide intelligence products to support deployed ship and shore operations. The Navy will also migrate to a Service Oriented Architecture (SOA) that requires the integration and testing of a Maritime ISR Enterprise capabilities, migration of ISR applications to a SOA environment, and integration to leverage a Common Computing Environment (CCE) and the Intelligence Community Information Technology Enterprise (IC ITE). DCGS-N will also become the focal point for migration of Maritime Domain Awareness (MDA) fusion and analysis Maritime Fusion & Analysis (MFAS) tool applications for the Navy. Additionally, Intelligence Surveillance and Reconnaissance (ISR) funding supports development and integration efforts to fuse Intelligence, Surveillance, Reconnaissance and Targeting (ISR&T) data collected, exploited and disseminated by ISR systems with other intelligence data and automatically provide to shipboard combat systems to support kinetic (bombs, mortars, missiles, bullets) and non-kinetic fires (electronic attack, lasers, cyber-attack) and more effective exploitation of the electromagnetic spectrum. ISR systems will play key roles in enabling the national-to-tactical integration necessary for an integrated maritime targeting capability in support of kinetic and non-kinetic fires.

Distributed Common Ground System-Navy (DCGS-N) Increment 1 is the Navy's current in service DCGS ISR&T program of record. The system is actively used by Navy force level ships and shore sites in support of the mission. DCGS-N Increment 1 is currently performing technical refreshes to Windows 10 (WIN 10) per the Department of Defense's initiatives while enabling the long-term transition to DCGS-N Increment 2.

Intelligence Carry-On Program (ICOP) is a suite of multi-source intelligence and analytical capabilities which includes an integrated Three-Dimensional (3-D) operational picture displaying intelligence and other data sources to provide a richer and more complete picture of the battle space on Unit Level platforms. The system supports a full motion video capability that receives, processes, exploits, and disseminates organic and non-organic data as well as the ability to process and correlate Electronic Intelligence (ELINT) and external Communications Intelligence (COMINT Externals). It integrates mature Commercial Off-the-Shelf (COTS) and Government Off-the-Shelf (GOTS) applications with shared storage and communication paths to reach back to the DCGS-N Enterprise Node (DEN), and to provide data sharing to the Maritime Operations Centers (MOC) and national ISR systems, making tactical users a part of the larger ISR enterprise.

DCGS-N Increment 2 addresses a critical shortfall in Tasking, Collection, Processing, Exploitation, and Dissemination (TCPED) capability and capacity to support operational, tactical planning, and execution across the full range of joint military operations. Existing TCPED shortfalls will be exacerbated by planned Navy, Joint, and Allied fielding of new ISR platforms. Currently fielded systems provide localized processing capabilities that will be overwhelmed in future years without a significant change in the way the Navy processes, exploits and disseminates intelligence data. DCGS-N Increment 2 will perform quick and affordable integration of emergent transformational COTS and GOTS technologies in support of information warfare and overall efforts required to pace the threat. DCGS-N Increment 2 will deliver all source fusion and analytical capabilities; provide MDA capabilities and integrate TCPED capabilities to improve the use and analysis of sensor and platform data. DCGS-N Increment 2 will be based on an enterprise solution to share this information across commands, services, and agencies to promote shared situational awareness. DCGS-N Increment 2 consists of multiple releases. The first release (Fleet Capability Release 1 (FCR-1)) provides an enhanced Navy ISR enterprise that converges and builds on the DCGS-N Increment 1 Enterprise Node; leverages the Defense Intelligence Information Enterprise (DI2E); is compliant with the Common Computing Environment (CCE) and the Community Information Technology Enterprise (IC ITE); federates ISR and TCPED workflow and production; exploits new and evolving unmanned systems sensor data; provides Multi-Intelligence (Multi-INT) cross-queuing and modular tools. The second release (Fleet Capability Release

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305208N *I Distributed Common Ground Sys*

2 (FCR-2)), enhances afloat ISR capabilities by providing a set of software centric tools providing Multi-INT fusion and analysis, behavior prediction and intelligent knowledge management designed to operate in disconnected or denied communications environment. DCGS-N Increment 2 will insert new technology enhancements via incremental software & hardware upgrades and deliver as annual build release. Follow-on releases will be developed based on Fleet requirements.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	46.150	42.846	41.474	-	41.474
Current President's Budget	40.150	42.846	0.000	-	0.000
Total Adjustments	-6.000	0.000	-41.474	-	-41.474
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	2.214	-	2.214
• Rate/Misc Adjustments	0.000	0.000	-43.688	-	-43.688
• Congressional Directed Reductions Adjustments	-6.000	-	-	-	-

Change Summary Explanation

Funding for projects 2174 and 2227 have been realigned out of PE 0305208N into PE 0304785N as part of Program Element Consolidation starting in FY20. Summaries located in PE 0304785N.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305208N / *Distributed Common Ground Sys*				Project (Number/Name) 2174 / *Distributed Common Ground System-Navy (DCGS-N)*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2174: *Distributed Common Ground System-Navy (DCGS-N)*	206.841	0.325	0.222	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	207.388
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		
Project MDAP/MAIS Code: MN40												

Note

Funding has been realigned out of PE 0305208N Project 2174, into PE 0304785N as part of RDTEN PE Consolidation starting in FY20.

A. Mission Description and Budget Item Justification

The Distributed Common Ground System - Navy (DCGS-N) is the Navy's portion of the Under Secretary of Defense, Intelligence (USD (I)) DCGS Family of Systems (FoS). The Department of Defense (DoD) has defined a DCGS architecture that will be compatible and interoperable across all of the Services' Intelligence, Surveillance, Reconnaissance and Targeting (ISR&T) systems and operations. DCGS accesses and ingests data from space borne, airborne, subsurface, and surface Intelligence, Surveillance, Reconnaissance (ISR) collection assets, intelligence databases and intelligence producers. This collected data is shared across a Joint enterprise using the DCGS Integration Backbone (DIB) and in time, the Defense Intelligence Information Enterprise (DI2E) to enhance access and sharing of ISR information across Joint forces through the use of common enterprise standards and services. DCGS FoS supports Joint Task Force (JTF)-level and below combat operations with critical intelligence for battle management and information dominance across the full spectrum of operations, including peace, conflict, war, and Overseas Contingency Operations (OCO). DCGS is a cooperative effort between the services, agencies, and DoD to provide systems capable of receiving, processing, exploiting, and disseminating data from airborne and national reconnaissance platforms. DCGS-N core components include the analyst workstation from the Global Command and Control System - Maritime (GCCS-M) - Integrated Imagery and Intelligence (I3), Generic Area Limitation Environment (GALE) Signal Intelligence (SIGINT), Common Geo-positioning Services (CGS), Image Product Library (IPL), Modernized Integrated Database (MIDB), Joint Concentrator Architecture (JCA) and Track Management Services (TMS).

The DCGS-N system represents the integration of 1) The processing and exploitation of tactical and Imagery Intelligence (IMINT) and SIGINT; 2) Precision target geopositioning, mensuration, and imagery dissemination capabilities; 3) Selected national IMINT requirements and processing capabilities from the National Geospatial-Intelligence Agency (NGA); and 4) Sharing of Intelligence, Surveillance, Reconnaissance and Targeting (ISR&T) and Command and Control information via DIB, DI2E, and Net-Centric Enterprise Services (NCES) standards with a wide range of customers (e.g.,GCCS-M), Joint Mission Planning System (JMPS), and many others). The DCGS-N efforts include investigation of emerging technologies through study, development, and associated testing for feasibility of program insertion.

The DCGS-N Enterprise Node (DEN), which incorporates current DIB standards and DI2E policy, facilitates interoperability and data sharing among the DCGS FoS. DCGS-N ensures compliance with the DoD DCGS network architecture.

The Navy is establishing an ISR Enterprise way ahead that will emphasize a reach back strategy to provide intelligence products to support deployed ship and shore operations. The Navy will also migrate to a Service Oriented Architecture (SOA) that requires the integration and testing of Maritime ISR Enterprise capabilities,

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** 2174 / *Distributed Common Ground System-Navy (DCGS-N)*

migration of ISR SOA applications, integration to leverage a Common Computing Environment (CCE) and the Intelligence Community Information Technology Enterprise (IC ITE). Additionally, DCGS-N will become the focal point for migration of Maritime Domain Awareness (MDA) fusion and analysis Maritime Fusion & Analysis (MFAS) tool applications for the Navy.

Distributed Common Ground System-Navy (DCGS-N) Increment 1 is the Navy's current in service DCGS ISR&T program of record. The system is actively used by Navy force level ships and shore sites in support of the mission. Program is currently performing technical refreshes to Windows 10 per the Department of Defense's initiatives while enabling the long-term transition to DCGS-N INC 2.

Intelligence Carry-On Program (ICOP) is a suite of multi-source intelligence and analytical capabilities which includes an integrated Three-Dimensional (3-D) operational picture displaying intelligence and other data sources to provide a richer and more complete picture of the battle space on unit level platforms. The system supports a full motion video capability that receives, processes, exploits, and disseminates organic and non-organic data as well as the ability to process and correlate Electronic Intelligence (ELINT) and external Communications Intelligence (COMINT Externals). It integrates mature Commercial Off-the-Shelf (COTS) and Government Off-the-Shelf (GOTS) applications with shared storage and communication paths to reach back to the DCGS-N Enterprise Node (DEN), and to provide data sharing to the Maritime Operations Centers (MOC) and national ISR systems, making tactical users a part of the larger ISR enterprise.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Distributed Common Ground System-Navy (DCGS-N) Increment 1	0.325	0.222	0.000	0.000	0.000
Articles:	-	-	-	-	-

FY 2019 Plans:
In FY19, DCGS-N Increment 1 will continue development, integration and regression testing that is required to remain aligned with emerging national imagery standards for tech refreshes and End-of-Life Upgrades.

FY 2020 Base Plans:
FY20 funding has been realigned into PE 0304785N Project 2174 as part of PE Consolidation.

FY 2020 OCO Plans:
N/A

FY 2019 to FY 2020 Increase/Decrease Statement:
Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under 0304785N Project 2174.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** 2174 / *Distributed Common Ground System-Navy (DCGS-N)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Distributed Common Ground System - Navy (DCGS-N) Increment 1's $0.089 million decrease from FY19 to FY20 is a result of efficiencies, Common Geospatial Services (CGS), and associated systems engineering services.					
Accomplishments/Planned Programs Subtotals	0.325	0.222	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN 2914: *Distributed Common Ground System-Navy (DCGS-N)*	19.012	10.219	21.788	-	21.788	22.422	17.307	17.565	17.953	212.550	594.942

Remarks

0305208N/2914 is a shared Program Element (PE) with Distributed Common Ground System-Navy (DCGS-N) Increment 1, Increment 2, and Intelligence Carry-On Program (ICOP)

D. Acquisition Strategy

DCGS-N Family of Systems (FoS) program utilizes mature Commercial-Off-The-Shelf (COTS) and Governmental-Off-The-Shelf (GOTS) capabilities. The Navy adapts and integrates these capabilities and ensures interoperability with the DCGS Integration Backbone (DIB) standards and Defense Intelligence Information Enterprise (DI2E) policies. Integration of DCGS-N Increment 1 components has transitioned from Government-led to Industry-led based on the award of DCGS-N Increment 1 Prime Mission Product (PMP) contract.

Intelligence Carry-On Program (ICOP) implements a cross-decking methodology that incorporates a two phased delivery, a permanent foundation kit which supports carry-on equipment to include workstation and CM3 antenna / receiver set. This methodology supports speed-to-fleet principles.

E. Performance Metrics

DCGS-N Increment 1 Goal: Meet national imagery standards.
DCGS-N Increment 1 Metric: Support development, integration and regression testing required to align with emerging national imagery standards.

ICOP Goal: Support unit-level Intelligence Surveillance Reconnaissance (ISR) processing, exploitation and dissemination for Surface Operations.
ICOP Metric: Rapidly employ new capabilities to deliver to first available afloat platform after receipt of successful test event / report.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305208N / *Distributed Common Ground Sys*	Project (Number/Name) 2174 / *Distributed Common Ground System-Navy (DCGS-N)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development Prior Years	Various	Various : Various	122.440	0.000		0.000		0.000		-		0.000	0.000	122.440	-
Integration Assembly & Test	C/CPFF	NSWC China Lake : China Lake, CA	0.593	0.315	Mar 2018	0.180	Jan 2019	0.000		-		0.000	0.000	1.088	-
Government Technical Oversight (Dev)	WR	SSC LANT : Charleston, SC	0.391	0.010	Jan 2019	0.042	Jan 2019	0.000		-		0.000	0.000	0.443	-
		Subtotal	123.424	0.325		0.222		0.000		-		0.000	0.000	123.971	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Prior Years	Various	Various : Various	45.769	0.000		0.000		0.000		-		0.000	0.000	45.769	-
		Subtotal	45.769	0.000		0.000		0.000		-		0.000	0.000	45.769	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation Prior Years	Various	Various : Various	26.470	0.000		0.000		0.000		-		0.000	0.000	26.470	-
		Subtotal	26.470	0.000		0.000		0.000		-		0.000	0.000	26.470	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services Prior Years	Various	Various : Various	11.178	0.000		0.000		0.000		-		0.000	0.000	11.178	-
		Subtotal	11.178	0.000		0.000		0.000		-		0.000	0.000	11.178	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305208N / *Distributed Common Ground Sys*	Project (Number/Name) 2174 / *Distributed Common Ground System-Navy (DCGS-N)*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	206.841	0.325		0.222		0.000		-		0.000	0.000	207.388	N/A

Remarks

FY20 cost data is provided under PE 0304785N Project 2174.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** 2174 / *Distributed Common Ground System-Navy (DCGS-N)*

CLASSIFICATION:

EXHIBIT R4, Schedule Profile

APPROPRIATION/BUDGET ACTIVITY	PROJECT NUMBER AND NAME
RDT&E, N / BA-7	2174 Distributed Common Ground System – Navy (DCGS-N)

Fiscal Year	2018				2019			
2174 DCGS-N	1	2	3	4	1	2	3	4
DCGS-N Increments 1 Tech Refresh	FOL/ECP/FC As Req				FOL/ECP/FC As Req			

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** 2174 / *Distributed Common Ground System-Navy (DCGS-N)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2174				
DCGS-N Increment 1 Tech Refresh	1	2018	4	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305208N / *Distributed Common Ground Sys*				Project (Number/Name) *2227 / Distributed Common Ground System (DCGS-N) Inc 2*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2227: *Distributed Common Ground System (DCGS-N) Inc 2*	64.353	39.825	42.624	0.000	-	0.000	0.000	0.000	0.000	0.000	130.708	277.510
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: M464

Note

Funding has been realigned out of PE 0305208N Project 2227, into PE 0304785N as part of RDTEN PE Consolidation starting in FY20.

Cost-To-Complete reflects Distributed Common Ground System - Navy (DCGS-N) Increment 2 only. DCGS-N Increment 2 reflects Department of Navy Component Cost Position (CCP).

A. Mission Description and Budget Item Justification

Distributed Common Ground System-Navy (DCGS-N) Increment 2 addresses a critical shortfall in Tasking, Collection, Processing, Exploitation, and Dissemination (TCPED) capability and capacity to support operational, tactical planning, and execution across the full range of joint military operations. Existing TCPED shortfalls will be exacerbated by planned Navy, Joint, and Allied fielding of new ISR platforms. Currently fielded systems provide localized processing capabilities that will be overwhelmed in future years without a significant change in the way the Navy processes, exploits and disseminates intelligence data. DCGS-N INC 2 will perform technical analyses and engineering efforts associated with implementation of new technology to enable rapid introduction of new products and technology, prevent obsolescence, and end of support issues. DCGS-N Increment 2 will deliver all source fusion and analytical capabilities; provide Maritime Domain Awareness (MDA) capabilities and integrate TCPED capabilities to improve the use and analysis of sensor and platform data. DCGS-N Increment 2 will be based on an enterprise solution to share this information across commands, services, and agencies to promote shared situational awareness. DCGS-N Increment 2 consists of multiple releases. The first release (Fleet Capability Release 1 (FCR-1)) provides an enhanced Navy ISR enterprise that converges and builds on the DCGS-N Increment 1 and MDA Enterprise Nodes; leverages the Defense Intelligence Information Enterprise (DI2E); is compliant with the Common Computing Environment (CCE) and the Community Information Technology Enterprise (IC ITE); federates ISR and TCPED workflow and production improving throughout the automation; exploits new and evolving unmanned systems sensor data; provides Multi-Intelligence (Multi-INT) cross-queuing and modular tools. The second release (Fleet Capability Release 2 (FCR-2)), enhances afloat ISR capabilities by providing a set of software centric tools providing Multi-INT fusion and analysis, behavior prediction and intelligent knowledge management designed to operate in disconnected or denied communications environment. Follow-on releases will be developed in a threat based approach pacing advances in ISR data, analytics, and mission to meet fleet requirements.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Distributed Common Ground System-Navy (DCGS-N) Increment 2	39.825	42.624	0.000	0.000	0.000
Articles:	1	1	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** 2227 / *Distributed Common Ground System (DCGS-N) Inc 2*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: In FY19, DCGS-N Increment 2 will conduct the Fielding Technical Review and Fielding Decision Review of Fleet Capability Release 1 (FCR-1) which comprises the ashore backbone of the Navy's Intelligence, Surveillance, Reconnaissance and Targeting (ISR&T) enterprise and will contain enterprise data and analytics, and synchronize the Common Intelligence Picture across the Fleet. This portion of the DCGS-N Increment 2 system will support future test events. DCGS-N Increment 2 will complete integration of Fleet Capability Release 2 (FCR-2) which comprises the afloat nodes of the Navy's ISR&T enterprise. DCGS-N Increment 2 will conduct an In Progress Test Review and Integrated Test of the FCR-2 build including rigorous cyber security testing. DCGS-N Increment 2 will continue to develop a standard software baseline for the DCGS Family of Systems (FoS), and will complete integration capabilities in Fleet Capability Release 2 (FCR-2), and begin integration of capabilities in Fleet Capability Release 3 (FCR-3). DCGS-N Increment 2 will begin planning for Fleet Capability Release 4 (FCR-4) including developing the Requirements Definition Package (RDP), preparing for the Build Technical Review and Build Decision. DCGS-N Increment 2 will develop one (1) unit for Initial Operational Test and Evaluation (IOT&E) hardware design and acquisition. DCGS-N Increment 2 will continue Passive Targeting Efforts leveraging Office of Naval Research (ONR) Electromagnetic Battle Management (EMBM) Future Naval Capabilities (FNC) to network and fuse Passive Targeting Data. ***FY 2020 Base Plans:*** FY20 funding has been realigned into PE 0304785N Project 2227 as part of PE Consolidation. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Program decrease is due to realigning funds as part of PE Consolidation. FY20 justification and change explanation is provided under 0304785N Project 2227. Overall, funding for project 2227 from FY19 to FY20 increased $0.374 million to support additional security architecture requirements for the integration of kinetic and non-kinetic fires. Additionally, the FY20 funding request was reduced by $1.736 million to account for the availability of prior year execution balances.					
Accomplishments/Planned Programs Subtotals	39.825	42.624	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** *2227 / Distributed Common Ground System (DCGS-N) Inc 2*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN 2914: *Distributed Common Ground System-Navy (DCGS-N)*	19.012	10.219	21.788	-	21.788	22.422	17.307	17.565	17.953	212.550	594.942

Remarks

0305208N/2914 is a shared Program Element (PE) with Distributed Common Ground System - Navy (DCGS-N) Increment 1, Increment 2, and Intelligence Carry-On Program (ICOP).

D. Acquisition Strategy

The Distributed Common Ground System-Navy (DCGS-N) Increment 2 acquisition is based on the Department of Defense Instruction (DODI) 5000.02, Model 3, for incrementally fielded software intensive programs.

E. Performance Metrics

DCGS-N Increment 2 Goal: Support afloat forces through a robust enterprise Intelligence Surveillance, Reconnaissance and Targeting (ISR&T) capability, satisfying maritime needs for processing, exploitation and dissemination.

DCGS-N Increment 2 Metric: Will complete integration capabilities Field Fleet Capability Release 3 (FCR-3) and begin integration of capabilities in Fleet Capability Release 4 (FCR-4).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** *2227 / Distributed Common Ground System (DCGS-N) Inc 2*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integration Assembly & Test	WR	SSC PAC : San Diego, CA	14.110	29.680	Oct 2017	31.465	Oct 2018	0.000		-		0.000	61.145	136.400	-
Primary Hardware Development	WR	SSC PAC : San Diego, CA	11.481	3.780	Nov 2017	2.199	Nov 2018	0.000		-		0.000	5.979	23.439	-
Software Development	WR	SSC PAC : San Diego, CA	28.052	0.000		0.000		0.000		-		0.000	0.000	28.052	-
Integration Assembly & Test	C/CPFF	SSC LANT : Charleston, SC	0.000	0.000		1.664	Nov 2018	0.000		-		0.000	1.664	3.328	-
Software Development	WR	SSC LANT : Charleston, SC	1.635	0.000		0.000		0.000		-		0.000	0.000	1.635	-
Government Technical Oversite (Dev)	WR	SSC LANT : Charleston, SC	0.409	0.780	Nov 2017	1.387	Nov 2018	0.000		-		0.000	2.167	4.743	-
		Subtotal	55.687	34.240		36.715		0.000		-		0.000	70.955	197.597	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	C/CPFF	SAIC : Columbia, MD	1.288	2.041	Mar 2018	1.741	Mar 2019	0.000		-		0.000	3.782	8.852	-
Development Support	WR	SSC LANT : Charleston, SC	0.300	0.171	Nov 2017	0.171	Nov 2018	0.000		-		0.000	0.342	0.984	-
Integrated Logistics Support	WR	SSC LANT : Charleston, SC	0.500	0.053	Nov 2017	0.053	Nov 2018	0.000		-		0.000	0.106	0.712	-
Integrated Logistics Support	C/CPFF	SAIC : Columbia, MD	1.545	0.330	Mar 2018	0.330	Dec 2018	0.000		-		0.000	0.660	2.865	-
		Subtotal	3.633	2.595		2.295		0.000		-		0.000	4.890	13.413	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305208N / *Distributed Common Ground Sys*	Project (Number/Name) *2227 / Distributed Common Ground System (DCGS-N) Inc 2*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	C/CPFF	SAIC : Columbia, MD	0.417	0.265	Mar 2018	0.265	Dec 2018	0.000		-		0.000	0.530	1.477	-
Developmental Test & Evaluation	WR	SSC LANT : Charleston, SC	0.537	0.240	Nov 2017	0.561	Nov 2018	0.000		-		0.000	0.801	2.139	-
Developmental Test & Evaluation	C/CPFF	JITC : Fort Meade, MD	0.800	0.100	May 2018	0.208	Dec 2018	0.000		-		0.000	0.308	1.416	-
Developmental Test & Evaluation	C/CPFF	COTF : Norfolk, VA	0.386	0.420	Feb 2018	0.420	Nov 2018	0.000		-		0.000	0.840	2.066	-
		Subtotal	2.140	1.025		1.454		0.000		-		0.000	2.479	7.098	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	SPAWAR : San Diego, CA	0.356	0.240	Dec 2017	0.240	Nov 2018	0.000		-		0.000	0.480	1.316	-
Government Engineering Support	WR	SSC LANT : Charleston, SC	0.308	0.200	Nov 2017	0.200	Nov 2018	0.000		-		0.000	0.400	1.108	-
Program Management Support	C/CPFF	BAH : San Diego, CA	1.179	1.010	Mar 2018	1.150	Nov 2018	0.000		-		0.000	2.160	5.499	-
Program Management Support	WR	SSC LANT : Charleston, SC	0.650	0.290	Nov 2017	0.290	Nov 2018	0.000		-		0.000	0.580	1.810	-
Program Management Support	WR	SSC PAC : San Diego, CA	0.400	0.225	Oct 2017	0.280	Nov 2018	0.000		-		0.000	0.505	1.410	-
		Subtotal	2.893	1.965		2.160		0.000		-		0.000	4.125	11.143	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	64.353	39.825		42.624		0.000		-		0.000	82.449	229.251	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305208N / *Distributed Common Ground Sys*	Project (Number/Name) *2227 / Distributed Common Ground System (DCGS-N) Inc 2*	

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

FY20 cost data is provided under PE 0304785N Project 2227.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** *2227 / Distributed Common Ground System (DCGS-N) Inc 2*

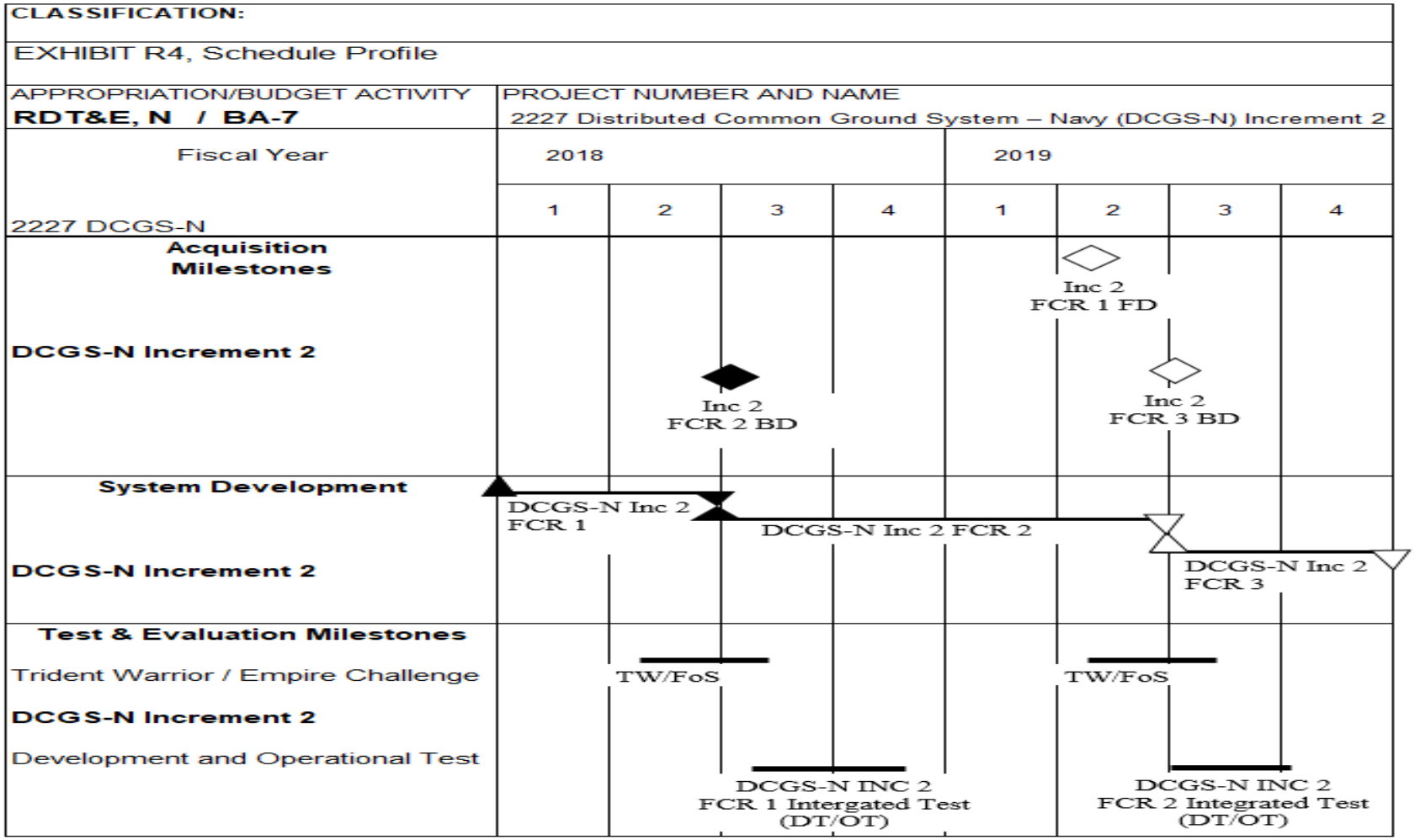


Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305208N / *Distributed Common Ground Sys*	**Project (Number/Name)** *2227 / Distributed Common Ground System (DCGS-N) Inc 2*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2227				
DCGS-N Inc 2 FCR-2 Build Decision (BD)	3	2018	3	2018
DCGS-N Inc 2 FCR-1 Fielding Decision (FD)	2	2019	2	2019
DCGS-N Inc 2 FCR-3 Build Decision (BD)	3	2019	3	2019
DCGS-N Inc 2 FCR-1 Development	1	2018	2	2018
DCGS-N Inc 2 FCR-2 Development	2	2018	2	2019
DCGS-N Inc 2 FCR-3 Development	2	2019	4	2019
Trident Warrior/DCGS Family of Systems (FoS) 2018	2	2018	3	2018
DCGS-N Inc 2 FCR-1 Integrated Test (DT/OT)	3	2018	4	2018
Trident Warrior/DCGS Family of Systems (FoS) 2019	2	2019	3	2019
DCGS-N Inc 2 FCR-2 Integrated Test (DT/OT)	3	2019	4	2019

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305220N *I (U)MQ-4C Triton*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	3,396.129	94.115	14.395	11.784	-	11.784	11.375	14.057	14.337	14.623	0.000	3,570.815
4020: *MQ-4C TRITON*	3,396.129	94.115	14.395	11.784	-	11.784	11.375	14.057	14.337	14.623	0.000	3,570.815
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 373												

Note

MQ-4C Triton RDT&E funding for modernization was segregated into a new program element (from PE 0305220N to PE 0305421N) in order to satisfy Congressional direction for increased transparency.

A. Mission Description and Budget Item Justification

MQ-4C Triton Unmanned Air System (UAS). The popular name Triton was approved for the MQ-4C UAS in June 2012, designating the RQ-4 Broad Area Maritime Surveillance UAS as the MQ-4C Triton.

The MQ-4C Triton is a high altitude-long endurance UAS designed to provide Fleet and combatant commanders with persistent maritime Intelligence, Surveillance and Reconnaissance (ISR) of nearly all the world's high-density sea-lanes, littorals, and areas of national interest. Teamed with its manned-capability counterpart, the P-8A, Triton will be a key component of the Navy's family of systems to achieve maritime domain awareness. MQ-4C Triton will seek to leverage Maritime Patrol and Reconnaissance Force manpower, training and maintenance efficiencies.

The MQ-4C Triton features sensors designed to provide near worldwide coverage through a network of five orbits inside and outside continental United States, with sufficient air vehicles to remain airborne for 24 hours a day, 7 days a week, out to ranges of 2,000 nautical miles. Onboard sensors will provide detection, classification, tracking and identification of maritime targets and include maritime radar, electro-optical/infra-red and Electronic Support Measures systems. Additionally, the MQ-4C will have a communications relay capability designed to link dispersed forces in the theater of operations and serve as a node in the Navy's networked strategy. Tactical-level data analysis will occur in real-time at shore-based mission control sites connected to the air vehicle via satellite communications. Further intelligence exploitation can be conducted at Fleet shore-based sites or aboard aircraft carriers and other ships.

The MQ-4C Triton UAS will implement phased capability upgrades within the ongoing acquisition program to pace capability with rapidly evolving technologies and threats to ensure the Navy maintains persistent ISR dominance through the system's lifecycle, and to support the Maritime Intelligence, Surveillance, Reconnaissance and Targeting (MISR&T) transition plan. System upgrades will include Multi-Intelligence capabilities, Counter Electronic Attack upgrades, a more robust electronic support capability, and continued improvements to baseline mission system payloads.

The MQ-4C air vehicle, mission control system, specialized sensors, and communications suite will play a significant role in achieving the Navy's strategic vision for the 21st century. The Triton system as a persistence ISR enabler provides the supported combatant commander and fleet commander with unparalleled situational awareness of the maritime battle space to develop and sustain the common operational tactical picture. The system will also serve as a Fleet response plan enabler

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305220N *I (U)MQ-4C Triton*

with a persistent, global force offering to provide critical trip wire information for intelligence preparation of the environment. Triton will connect to both the Global Information Grid and the Distributed Common Ground System-Navy information backbone to provide the Warfighter with unprecedented levels of battlespace awareness to synchronize actions necessary to maintain maritime Full Spectrum Superiority.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	84.115	14.395	11.796	-	11.796
Current President's Budget	94.115	14.395	11.784	-	11.784
Total Adjustments	10.000	0.000	-0.012	-	-0.012
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	10.000	0.000			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	-0.012	-	-0.012

Change Summary Explanation

FY 2019 to FY 2020 funding decrease due to completion of baseline MQ-4C Triton System Development and Demonstration efforts. FY 2020 funding supports the continuation of Fatigue Testing and Analysis.

Schedule:
Baseline Early Operational Capability (EOC) moved 5 Quarters to 3rd Quarter FY 2019 due to schedule delays during the operational test period and the operational pause in flight test resulting from an aircraft mishap in September 2018
Multi-INT EOC moved 2 Quarters to 2nd Quarter FY 2021 due to delayed completion of retrofit aircraft
Baseline Operational Test Event end date changed to align to the planned System Development and Demonstration completion of 2nd Quarter FY 2019
Updated schedule to reflect Airframe Fatigue Testing and Analysis start of 2nd Quarter FY 2018
Initiate Integrated Functional Capability (IFC-5.0) development 1st Quarter FY 2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305220N / *(U)MQ-4C Triton*				Project (Number/Name) 4020 / *MQ-4C TRITON*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
4020: *MQ-4C TRITON*	3,396.129	94.115	14.395	11.784	-	11.784	11.375	14.057	14.337	14.623	0.000	3,570.815
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 373

A. Mission Description and Budget Item Justification

MQ-4C Triton Unmanned Air System (UAS). The MQ-4C Triton is a high altitude-long endurance UAS designed to provide Fleet and combatant commanders with persistent maritime Intelligence, Surveillance and Reconnaissance (ISR) of nearly all the world's high-density sea-lanes, littorals, and areas of national interest. Teamed with its manned-capability counterpart, the P-8A, Triton will be a key component of the Navy's family of systems to achieve maritime domain awareness. MQ-4C Triton will seek to leverage Maritime Patrol and Reconnaissance Force manpower, training and maintenance efficiencies.

The MQ-4C Triton features sensors designed to provide near worldwide coverage through a network of five orbits inside and outside continental United States, with sufficient air vehicles to remain airborne for 24 hours a day, 7 days a week, out to ranges of 2,000 nautical miles. Onboard sensors will provide detection, classification, tracking and identification of maritime targets and include maritime radar, electro-optical/infra-red and Electronic Support Measures systems. Additionally, the MQ-4C will have a communications relay capability designed to link dispersed forces in the theater of operations and serve as a node in the Navy's networked strategy. Tactical-level data analysis will occur in real-time at shore-based mission control sites connected to the air vehicle via satellite communications. Further intelligence exploitation can be conducted at Fleet shore-based sites or aboard aircraft carriers and other ships.

The MQ-4C Triton UAS will implement phased capability upgrades within the ongoing acquisition program to pace capability with rapidly evolving technologies and threats to ensure the Navy maintains persistent ISR dominance through the system's lifecycle, and to support the Maritime Intelligence, Surveillance, Reconnaissance and Targeting (MISR&T) transition plan. System upgrades will include Multi-Intelligence capabilities, Counter Electronic Attack upgrades, a more robust electronic support capability and continue improvements to baseline mission system payloads.

The MQ-4C air vehicle, mission control system, specialized sensors, and communications suite will play a significant role in achieving the Navy's strategic vision for the 21st century. The Triton system as a persistence ISR enabler provides the supported combatant commander and fleet commander with unparalleled situational awareness of the maritime battle space to develop and sustain the common operational tactical picture. The system will also serve as a Fleet response plan enabler with a persistent, global force offering to provide critical trip wire information for intelligence preparation of the environment. Triton will connect to both the Global Information Grid and the Distributed Common Ground System-Navy information backbone to provide the Warfighter with unprecedented levels of battlespace awareness to synchronize actions necessary to maintain maritime Full Spectrum Superiority.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Title: Product Development	81.068	13.699	11.181	0.000	11.181
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305220N / *(U)MQ-4C Triton*	**Project (Number/Name)** 4020 / *MQ-4C TRITON*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Awarded contract in FY 2008 to initiate the MQ-4C Triton System Development and Demonstration (SDD) phase effort. The Prime Contractor is responsible for overall system development and performance, as well as associated management, engineering and logistics activities. ***FY 2019 Plans:*** Complete SDD. Funding decreases from FY 2018 reflect completion of baseline MQ-4C Triton SDD development efforts which transition to Triton's Multi-INT capability. Efforts within this PE continue on airframe fatigue testing and analysis. ***FY 2020 Base Plans:*** Efforts within this PE continue on airframe fatigue testing and analysis. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $2.518 million from FY 2019 to FY 2020 reflects completion of baseline MQ-4C Triton SDD efforts and transition to required resource levels for airframe fatigue testing and analysis.					
Title: ILS, Support, Studies & Analysis	0.325	0.305	0.305	0.000	0.305
Articles:	-	-	-	-	-
Description: Integrated Logistics Support, Studies and Analysis. ***FY 2019 Plans:*** Continue integrated logistics support, logistics supportability analyses and environmental planning, and development of technical data to support fielding of the MQ-4C Triton UAS capabilities. ***FY 2020 Base Plans:*** Continue integrated logistics support, logistics supportability analyses and environmental planning, and development of technical data to support fielding of the MQ-4C Triton UAS capabilities. ***FY 2020 OCO Plans:*** N/A					
Title: Test & Evaluation (T&E)	12.684	0.373	0.280	0.000	0.280
Articles:	-	-	-	-	-
Description: T&E efforts.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305220N / *(U)MQ-4C Triton*	**Project (Number/Name)** 4020 / *MQ-4C TRITON*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: Continue Developmental Test support of MQ-4C Triton fatigue testing. ***FY 2020 Base Plans:*** Continue Developmental Test support of MQ-4C Triton fatigue testing. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $0.093 million from FY 2019 to FY 2020 reflects a completion in baseline MQ-4C Triton SDD development efforts.					
Title: Program Management (PM)	0.038	0.018	0.018	0.000	0.018
Articles:	-	-	-	-	-
Description: PM support and travel. ***FY 2019 Plans:*** Continue the following: PM support and travel, development of milestone and acquisition-related documentation, capability refinement and open systems architecture development, resource justification, affordability assessments and cost analyses, risk reduction and risk management, system integration and interoperability planning, technology maturity reviews, program protection planning, corrosion prevention planning, and joint and international cooperation efforts. ***FY 2020 Base Plans:*** Continue the following: PM support and travel, development of milestone and acquisition-related documentation, capability refinement and open systems architecture development, resource justification, affordability assessments and cost analyses, risk reduction and risk management, system integration and interoperability planning, technology maturity reviews, program protection planning, corrosion prevention planning, and joint and international					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305220N / *(U)MQ-4C Triton*	**Project (Number/Name)** 4020 / *MQ-4C TRITON*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
cooperation efforts.					
FY 2020 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	94.115	14.395	11.784	0.000	11.784

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/0305421N: *RQ-4 Modernization*	224.249	219.403	202.346	-	202.346	71.964	115.546	103.921	97.393	75.000	1,404.191
• APN/0442: *MQ-4 Triton*	552.806	602.539	493.273	-	493.273	523.992	623.077	632.308	712.354	5,608.478	10,798.808
• APN/0605/J0442: *Spares and Repair Parts*	114.652	43.903	171.874	-	171.874	4.730	11.861	2.793	0.000	0.000	549.618
• APN/0596: *MQ-4 Series*	13.296	48.278	27.994	-	27.994	12.992	36.992	50.991	17.990	0.000	208.533
• OMN/1D4D: *Weapons Maintenance*	9.996	16.220	23.902	-	23.902	37.407	45.926	46.869	47.827	Continuing	Continuing

Remarks

D. Acquisition Strategy

The MQ-4C Triton acquisition approach supports the Navy's Maritime Intelligence, Surveillance, Reconnaissance, and Targeting (MISR&T) Transition Plan by providing a stable and effective baseline early operational capability (EOC) in 2019 to facilitate Fleet introduction and learning while continuing System Development and Demonstration engineering and integrated test on Signals Intelligence (SIGINT) and other upgrades to deliver a Multi-INT configuration at Initial Operational Capability (IOC). Phased capability upgrades will continue post IOC to enable the MQ-4C Triton to keep pace with rapidly evolving technologies and threats, and address correction of deficiencies and obsolescence issues to ensure the Navy maintains persistent Intelligence, Surveillance and Reconnaissance dominance through the system's lifecycle.

E. Performance Metrics

Successfully achieve Operational Evaluation and EOC.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305220N / *(U)MQ-4C Triton*	Project (Number/Name) 4020 / *MQ-4C TRITON*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	C/CPIF	Northrop Grumman : Rancho Bernardo, CA	2,766.685	76.558	Nov 2017	12.263	Nov 2018	9.723	Nov 2019	-		9.723	50.407	2,915.636	2,910.636
Systems Engineering	Various	Various : Various	19.031	0.010	Nov 2017	0.000		0.000		-		0.000	0.000	19.041	-
Systems Engineering	WR	NAWC-AD : Patuxent River, MD	239.824	4.500	Nov 2017	1.436	Nov 2018	1.458	Nov 2019	-		1.458	2.885	250.103	-
Systems Engineering	WR	NAWC-WD : China Lake, CA	13.418	0.000		0.000		0.000		-		0.000	0.000	13.418	-
Contractor Engineering	C/CPFF	Mitre : Mclean, VA	4.044	0.000		0.000		0.000		-		0.000	0.000	4.044	4.044
Prior Year Prod Dev no longer in the FYDP	Various	Various : Various	24.553	0.000		0.000		0.000		-		0.000	0.000	24.553	-
		Subtotal	3,067.555	81.068		13.699		11.181		-		11.181	53.292	3,226.795	N/A

Remarks

The Primary Hardware Development line resources Northrop Grumman for prime contractor activities, which include System Development and Demonstration (SDD) and System Demonstration Test Article (SDTA) vehicles and Fatigue Testing.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	Various	Various : Various	21.552	0.000		0.000		0.000		-		0.000	0.000	21.552	-
Integrated Logistics Support	Various	Various : Various	21.300	0.025	Nov 2017	0.005	Nov 2018	0.005	Nov 2019	-		0.005	0.020	21.355	-
Integrated Logistics Support	WR	NAWC-AD : Patuxent River, MD	54.359	0.300	Nov 2017	0.300	Nov 2018	0.300	Nov 2019	-		0.300	1.200	56.459	-
Prior year cost no longer funded in the FYDP	Various	Various : Various	10.784	0.000		0.000		0.000		-		0.000	0.000	10.784	-
		Subtotal	107.995	0.325		0.305		0.305		-		0.305	1.220	110.150	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305220N / *(U)MQ-4C Triton*	Project (Number/Name) 4020 / *MQ-4C TRITON*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	Various	Various : Various	19.675	0.695	Nov 2017	0.000		0.000		-		0.000	0.000	20.370	-
Developmental Test & Evaluation	WR	NAWC-AD : Patuxent River, MD	150.343	10.640	Nov 2017	0.373	Nov 2018	0.280	Nov 2019	-		0.280	0.000	161.636	-
Operational Test & Evaluation	Various	Various : Various	3.133	1.000	Nov 2017	0.000		0.000		-		0.000	0.000	4.133	-
Developmental Test & Evaluation (SATCOMM)	MIPR	DITCO : Various	10.835	0.349	Nov 2017	0.000		0.000		-		0.000	0.000	11.184	-
		Subtotal	183.986	12.684		0.373		0.280		-		0.280	0.000	197.323	N/A

Management Services ($ in Millions)

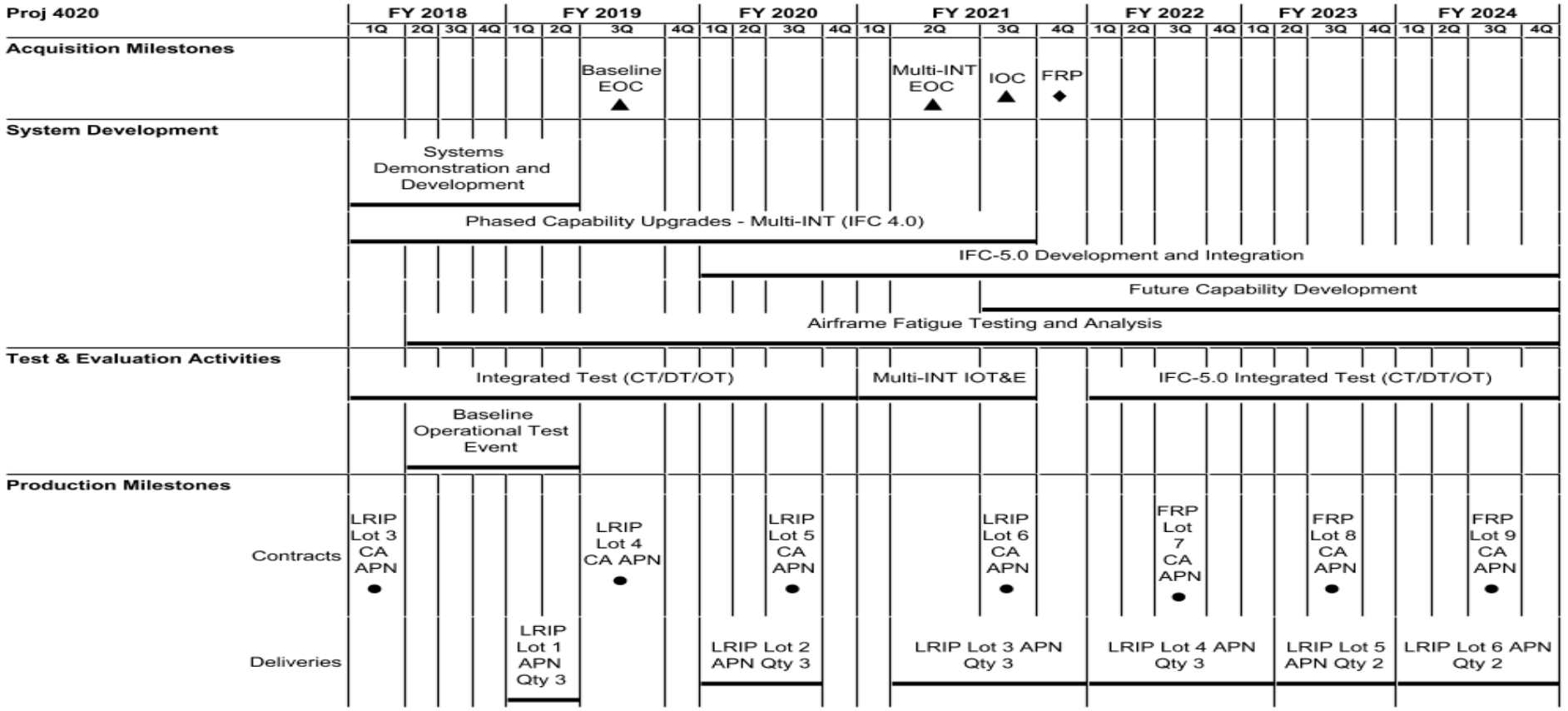
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Various : Various	3.507	0.000		0.000		0.000		-		0.000	0.000	3.507	-
Travel	Allot	Various : Various	1.754	0.038	Nov 2017	0.018	Nov 2018	0.018	Nov 2019	-		0.018	0.054	1.882	-
Program Management Support	C/CPFF	Ausley : Lexington Park, MD	26.324	0.000		0.000		0.000		-		0.000	0.000	26.324	26.324
Prior year cost no longer funded in the FYDP	Various	Various : Various	5.008	0.000		0.000		0.000		-		0.000	0.000	5.008	-
		Subtotal	36.593	0.038		0.018		0.018		-		0.018	0.054	36.721	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3,396.129	94.115		14.395		11.784		-		11.784	54.566	3,570.989	N/A

Remarks

Prior to FY10, MQ-4C Triton, formerly known as RQ-4 Broad Area Maritime Surveillance (BAMS), was budgeted for in PE 0305205N: Endurance Unmanned Aer Veh.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305220N / *(U)MQ-4C Triton*	**Project (Number/Name)** 4020 / *MQ-4C TRITON*



2020PB - 0305220N - 4020 MQ-4C Triton development activities are resourced by PE 0305220N and PE 0305421N. Schedule updated to reflect changes in acquisition and production milestones and planned system development efforts to include fatigue testing and analysis and initiation of the IFC 5.0 development and test efforts. The LRIP Lot 2 contract award is comprised of 1 FY16 and 2 FY17 resourced aircraft.

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305220N / *(U)MQ-4C Triton*	**Project (Number/Name)** 4020 / *MQ-4C TRITON*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 4020				
Acquisition Milestones: Full Rate Production	4	2021	4	2021
Acquisition Milestones: Initial Operational Capability	3	2021	3	2021
Acquisition Milestones: Multi-INT Early Operational Capability (IFC 4.0)	2	2021	2	2021
Acquisition Milestones: Baseline Early Operational Capability	3	2019	3	2019
System Development: System Development and Demonstration	1	2018	2	2019
System Development: Phased Capability Upgrades - Multi-INT (IFC 4.0)	1	2018	3	2021
System Development: IFC-5.0 Development and Integration	1	2020	4	2024
System Development: Future Capability Development	3	2021	4	2024
System Development: Airframe Fatigue Testing and Analysis	2	2018	4	2024
Test & Evaluation Activities: Integrated Test (Combined/Developmental/Operational)	1	2018	4	2020
Test & Evaluation Activities: Multi-INT Initial Operational Test and Evaluation	1	2021	3	2021
Test & Evaluation Activities: IFC-5.0 Integrated Test (Combined/Developmental/ Operational)	1	2022	4	2024
Test & Evaluation Activities: Baseline Operational Test Event	2	2018	2	2019
Production Milestones: Contracts: Low Rate Initial Production Lot 3 Contract Award	1	2018	1	2018
Production Milestones: Contracts: Low Rate Initial Production Lot 4 Contract Award	3	2019	3	2019
Production Milestones: Contracts: Low Rate Initial Production Lot 5 Contract Award	3	2020	3	2020
Production Milestones: Contracts: Low Rate Initial Production Lot 6 Contract Award	3	2021	3	2021
Production Milestones: Contracts: Full Rate Production Lot 7 Contract Award	3	2022	3	2022
Production Milestones: Contracts: Full Rate Production Lot 8 Contract Award	3	2023	3	2023
Production Milestones: Contracts: Full Rate Production Lot 9 Contract Award	3	2024	3	2024
Production Milestones: Deliveries: Low Rate Initial Production Lot 1 Delivery	1	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305220N / *(U)MQ-4C Triton*	**Project (Number/Name)** 4020 / *MQ-4C TRITON*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: Deliveries: Low Rate Initial Production Lot 2 Delivery	1	2020	3	2020
Production Milestones: Deliveries: Low Rate Initial Production Lot 3 Delivery	2	2021	4	2021
Production Milestones: Deliveries: Low Rate Initial Production Lot 4 Delivery	1	2022	1	2023
Production Milestones: Deliveries: Low Rate Initial Production Lot 5 Delivery	2	2023	4	2023
Production Milestones: Deliveries: Low Rate Initial Production Lot 6 Delivery	1	2024	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305231N *I MQ-8 UAV*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	490.533	62.656	24.143	29.618	-	29.618	29.763	20.300	12.637	8.991	146.213	824.854
2768: *MQ-8 Fire Scout*	490.533	62.656	9.843	29.618	-	29.618	29.763	20.300	12.637	8.991	146.213	810.554
9999: *Congressional Adds*	0.000	0.000	14.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.300
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 253												

A. Mission Description and Budget Item Justification

The MQ-8 Unmanned Air System is a Joint Military Intelligence Program.

The MQ-8 Unmanned Air System is popularly known as "Fire Scout". The program achieved MS C in June 2017. The program includes MQ-8B air vehicles, MQ-8C air vehicles, and associated Mission Control Systems (MCS), Unmanned Aerial Vehicle Common Automatic Recovery Systems (UCARS) and support equipment. In addition to the air vehicles, Radar and Weapons capabilities were developed under the Navy's Rapid Deployment Capability (RDC) authorities. All acquisition actions previously planned under the RDCs have transitioned into the Program of Record (POR). Current analysis has determined that a total procurement of 68 air vehicles will satisfy current and foreseeable operational needs.

The MQ-8 System provides real-time and non-real-time Intelligence, Surveillance and Reconnaissance (ISR) data to tactical users without the use of manned aircraft or reliance on limited joint theater or national assets. The baseline MQ-8 can accomplish missions including over-the-horizon tactical reconnaissance, classification, targeting and laser designation and battle damage assessment (including voice communications relay). Development efforts respond to emerging fleet requirements through integration and improvements to Common Operational Picture capabilities, avionics, payloads, range, endurance, and targeting.

The MQ-8 launches and recovers vertically, and can operate from suitably-equipped air capable ships, as well as confined area land bases. Interoperability is achieved through the use of the Tactical Control System (TCS) software in the MCS, also referred to as a Ground Control Station (GCS), and through the use of the Tactical Common Data Link (TCDL). The data from the MQ-8 is provided through standard DoD Command, Control, Communications, Computers and ISR (C4ISR) system architectures and protocols.

A deployed MQ-8 system includes air vehicle(s), payloads (i.e. electro-optical/infrared/laser designator-range finder, Automated Identification System, voice communications relay, Radar, Weapons, and other specialty payloads), MCS (with TCS and TCDL integrated for interoperability), a UCARS for automatic launch and recovery, and associated spares and support equipment. The schedules for MCS and UCARS components are based on host ship requirements, while schedules for air vehicle components, support equipment, and training equipment are based on operational deployment plans. A limited number of land-based mission control systems supplement the shipboard systems to support shore-based operations, such as pre-deployment or acceptance functional check flights. These land-based mission control stations will also support depot-level maintenance/post-maintenance activities. The MQ-8C provides additional mission endurance and payload-weight-power, increased reliability, and improved maintainability to the MQ-8 Fire Scout System. MQ-8 systems will support missions on Littoral Combat Ship (LCS), Expeditionary Mobile Base

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305231N *I MQ-8 UAV*

(T-ESB), FFG(X), and/or suitably-equipped air capable ships. Quantities of air vehicles are derived from LCS and/or suitably-equipped air capable ship deployment requirements for Surface Warfare and Mine Countermeasures mission sets.

The MQ-8 Radar capability is the initial effort as part of the Surface Warfare (SUW) Increment of the MQ-8C. A non-developmental maritime Radar has been competitively selected for integration into the MQ-8C Fire Scout System. This system will provide the MQ-8 operators and the supported LCS, T-ESB and FFG(X) crew enhanced situational awareness of the Recognized Maritime Picture (RMP) by providing multiple operational modes to include surface search, track, Inverse Synthetic Aperture Radar (ISAR) maritime target classification, and Synthetic Aperture Radar (SAR) target classification capabilities. The maritime Radar will be fully integrated with the Mission Control Systems (MCS) and ship's combat systems providing data in standardized format for ease of dissemination to other users.

The MQ-8C Link-16 capability will disseminate sensor tack data to other Link-16 participants contributing to the Common Operational Picture. Both Line-of-Sight (LOS) and Beyond (BLOS) capability will connect Fleet users and disadvantaged users increasing situational awareness. Additionally, the Link-16 In-Flight Target Update (IFTU) capability will allow for Network Enabled Weapon Targeting (NEW-T) for Over-the-Horizon Targeting (OTH-T). Minotaur will be used to correlate sensor data and manage the Link-16 network.

This budget prioritizes system wholeness to ensure program of record capabilities are fully integrated and support fleet requirements. System wholeness supports completion of MQ-8C operational test requirements, development of radar, and component redesign required to maintain system hardware.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	62.656	9.843	17.687	-	17.687
Current President's Budget	62.656	24.143	29.618	-	29.618
Total Adjustments	0.000	14.300	11.931	-	11.931
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	14.300			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	12.000	-	12.000
• Rate/Misc Adjustments	0.000	0.000	-0.069	-	-0.069

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *Radar Integration*	0.000	5.500
Congressional Add: *Weapons Capability Integration*	0.000	8.800

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305231N *I MQ-8 UAV*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Congressional Add Subtotals for Project: 9999	0.000	14.300
Congressional Add Totals for all Projects	0.000	14.300

Change Summary Explanation

The FY 2020 funding request was reduced by $11.000 million to account for the availability of prior year execution balances.

FY 2020 budget incorporates the execution delays caused by protest of the Radar Source Selection, while maintaining the Radar schedule. The additional increase to the FY 2020 budget is required to support critical activities which consist of conducting flight test, integration of MQ-8C Radar, and support Link-16 integration. The FY 2020 budget includes the addition of Link-16 to the Program of Record.

The FY2019 budget increased due to Congressional Adds provided for Radar Integration ($5.5M) and Weapons Capability Integration ($8.8M). The Congressional Add for Radar Integration is required for MQ-8C Radar System wholeness in order to maintain the Radar schedule in support of IOC and deployment dates. The increase in FY2019 Radar funding supports Radar System Developmental Test (DT) in FY2019 and continued studies for MQ-8C Sense and Avoid (SAA) and Back-up Landing System capabilities to support MQ-8C operational employment with Radar. The Congressional add for Weapons Capability Integration ($8.8M) supports requirements outlined in the MQ-8C Capabilities Production Document (CPD), to include trade studies for MQ-8C weaponization.

Technical: FY 2020 adds Link-16 capability with In-Flight Target Updates (IFTU) to Network Enabled Weapons for Over-the-Horizon Targeting (OTH-T). Remaining FYDP funding supports completion of Radar development, MQ-8C and Radar test requirements, and continued weapons studies. Radar and weapons funding supports requirements outlined in the MQ-8C Capabilities Production Document (CPD). Test funding supports developmental test and operational test events to meet Initial Operational Capability (IOC), and deployment dates. Future payload efforts will be considered when developing current efforts.

Schedule:
Updated milestone reviews and contract award dates for Radar and Link-16. Added contract award dates for Weapons studies.
Updated production and delivery schedules for the current production plan.
Added Milestone reviews and contract award dates for Link-16.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305231N / *MQ-8 UAV*				Project (Number/Name) 2768 / *MQ-8 Fire Scout*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2768: *MQ-8 Fire Scout*	490.533	62.656	9.843	29.618	-	29.618	29.763	20.300	12.637	8.991	146.213	810.554
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 253

A. Mission Description and Budget Item Justification

This budget prioritizes system wholeness to ensure program of record capabilities are fully integrated and support fleet requirements. System wholeness supports completion of MQ-8C operational test requirements, development of radar, development of Link-16, component redesign required to maintain system hardware and trade studies for the MQ-8C weaponization requirements.

The MQ-8 Unmanned Air System is popularly known as "Fire Scout". The program achieved MS C in June 2017. The program includes MQ-8B air vehicles, MQ-8C air vehicles, and associated Mission Control Systems (MCS), Unmanned Aerial Vehicle Common Automatic Recovery Systems (UCARS) and support equipment. In addition to the air vehicles, Radar and Weapons capabilities were developed under the Navy's Rapid Deployment Capability (RDC) authorities. All acquisition actions previously planned under the RDCs have transitioned into the Program of Record (POR). Current analysis has determined that a total fleet requirement of 68 air vehicles (59 procurement and 9 RDT&EN / 30 MQ-8Bs and 38 MQ-8Cs) will satisfy current Fleet needs.

The MQ-8 System provides real-time and non-real-time Intelligence, Surveillance and Reconnaissance (ISR) data to tactical users without the use of manned aircraft or reliance on limited joint theater or national assets. The baseline MQ-8 can accomplish missions including over-the-horizon tactical reconnaissance, classification, targeting and laser designation and battle damage assessment (including voice communications relay). Development efforts respond to emerging fleet requirements through integration and improvements to Common Operational Picture capabilities, avionics, payloads, range, endurance, and targeting.

The MQ-8 launches and recovers vertically, and can operate from suitably-equipped air capable ships, as well as confined area land bases. Interoperability is achieved through the use of the Tactical Control System (TCS) software in the MCS, also referred to as a Ground Control Station (GCS), and through the use of the Tactical Common Data Link (TCDL). The data from the MQ-8 is provided through standard DoD Command, Control, Communications, Computers and ISR (C4ISR) system architectures and protocols.

A deployed MQ-8 system includes air vehicle(s), payloads (i.e. electro-optical/infrared/laser designator-range finder, Automated Identification System, voice communications relay, Radar, Weapons, and other specialty payloads), MCS (with TCS and TCDL integrated for interoperability), a UCARS for automatic launch and recovery, and associated spares and support equipment. The schedules for MCS and UCARS components are based on host ship requirements, while schedules for air vehicle components, support equipment, and training equipment are based on operational deployment plans. A limited number of land-based mission control systems supplement the shipboard systems to support shore-based operations, such as pre-deployment or acceptance functional check flights. These land-based mission control stations will also support depot-level maintenance/post-maintenance activities. The MQ-8C provides additional mission endurance and payload-weight-power, increased reliability, and improved maintainability to the MQ-8 Fire Scout System. MQ-8 systems will support missions on Littoral Combat Ship (LCS), Expeditionary Mobile Base

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 2768 / *MQ-8 Fire Scout*

(T-ESB), FFG(X), and/or suitably-equipped air capable ships. Quantities of air vehicles are derived from LCS and/or suitably-equipped air capable ship deployment requirements for Surface Warfare and Mine Countermeasures mission sets.

The MQ-8 Radar capability is the initial effort as part of the Surface Warfare (SUW) Increment of the MQ-8C. A non-developmental maritime Radar has been competitively selected for integration into the MQ-8C Fire Scout System. This system will provide the MQ-8 operators and the supported LCS crew enhanced situational awareness of the Recognized Maritime Picture (RMP) by providing multiple operational modes to include surface search, track, Inverse Synthetic Aperture Radar (ISAR) maritime target classification, and Synthetic Aperture Radar (SAR) target classification capabilities. The maritime Radar will be fully integrated with the Mission Control Systems (MCS) and ship's combat systems providing data in standardized format for ease of dissemination to other users.

The MQ-8C Link-16 capability will disseminate sensor tack data to other Link-16 participants contributing to the Common Operational Picture. This capability will connect Fleet users and disadvantaged users increasing situational awareness. Additionally, the Link-16 In-Flight Target Update (IFTU) capability will allow for Network Enabled Weapon Targeting (NEW-T) for Over-the-Horizon Targeting (OTH-T). Minotaur will be used to correlate sensor data and manage the Link-16 network.

The MQ-8C Weapons capability integration study will evaluate weapons requirements outlined in the MQ-8C Capabilities Production Document (CPD). Weapons trade study will be conducted to assess the mission effectiveness and potential impacts of adding candidate weapons systems to the MQ-8C Fire Scout in a Surface Warfare (SUW) scenario. Additional trade studies will be conducted to analyze weapons platform integration, software architecture, stores management, and air vehicle structural requirements for addition of the MQ-8C Weapons capability.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Hardware and System Development	31.375	1.193	13.716	0.000	13.716
Articles:	-	-	-	-	-
FY 2019 Plans: Continue MQ-8C hardware, software modifications, other payload integration, cyber vulnerability closure and safety capability improvements such as backup landing system and collision avoidance systems. Continue MQ-8 integration and testing on LCS. Continue integration of the selected Radar with the MQ-8C Air Vehicle and MCS. Complete qualification of the selected Radar for the MQ-8C operational environment. Complete System Integration Lab testing of the software build for the maritime Radar integration. Continue MQ-8 FOT&E. Finalize Statement of Work, specification documentation, draft Request for Proposals (RFP), and release RFPs for Link-16. Conduct MQ-8C Weapons Studies.					
FY 2020 Base Plans: Continue MQ-8C hardware, software modifications, other payload integration, cyber vulnerability closure and safety capability improvements such a backup landing system and collision avoidance systems. Continue MQ-8 integration and testing on LCS. Continue integration of the selected Radar with the MQ-8C Air Vehicle and MCS.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 2768 / *MQ-8 Fire Scout*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Award contracts and hold System Requirements Review (SRR) for Link-16. Complete System Integration Lab testing of the software build for the maritime Radar integration. Continue MQ-8 FOT&E. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increases funding supports MQ-8C Link-16 capability and integration efforts and radar development.					
Title: Development/Operational Testing ***Articles:*** ***FY 2019 Plans:*** Continue Dynamic Interface testing of MQ-8C on both classes of Littoral Combat Ship (LCS). Continue MQ-8C developmental testing of hardware and software modifications and planning for other payload integration. Start developmental testing for Radar integration on MQ-8C. Complete MQ-8C IOT&E and continue MQ-8 FOT&E. ***FY 2020 Base Plans:*** Continue MQ-8C developmental testing of hardware and software modifications and planning for other payload integration. Continue developmental Testing of the maritime Radar on the MQ-8C Air Vehicle. Continue MQ-8 FOT&E. Support Link-16 integration efforts on the MQ-8C to include System Requirements Review (SRR). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2020 funding takes into account the execution delays caused by protest of the Radar Source Selection while maintaining the Radar schedule. Additionally, FY 2020 budget supports critical flight test, development, and integration of MQ-8C Radar and Link-16.	19.616 -	5.268 -	7.353 -	0.000 -	7.353 -
Title: Engineering and Technical Services ***Articles:*** ***FY 2019 Plans:*** Continue engineering, program technical management, and logistics support of the MQ-8C. Continue acquisition planning and execution to transition the Radar and Weapons capabilities. Continue Radar, Weapons, other payloads, LCS integration, and system studies and design. Continue MQ-8 FOT&E. ***FY 2020 Base Plans:***	11.665 -	3.382 -	8.549 -	0.000 -	8.549 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 2768 / *MQ-8 Fire Scout*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue engineering, program technical management, logistics support of the MQ-8C. Continue acquisition planning and execution to transition the Radar and Weapons capabilities. Continue Radar, Weapons, other payloads, LCS integration, and system studies and design. Continue MQ-8 FOT&E. Initiate Link-16 System Integration studies and procurement development. Award contracts and hold System Requirements Review (SRR) for the Link-16 Program of Record. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase results from Radar flight testing and Link-16 integration.					
Accomplishments/Planned Programs Subtotals	62.656	9.843	29.618	0.000	29.618

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0443: *MQ-8 UAV*	128.812	89.061	44.957	-	44.957	40.377	59.222	40.485	41.288	56.632	1,582.170
• APN/0605: *MQ-8 UAV Spares*	0.243	0.000	0.099	-	0.099	0.000	0.000	0.000	0.000	15.939	128.209
• APN/0588: *MQ-8 Series*	22.593	37.907	34.686	-	34.686	40.047	33.791	31.016	31.050	36.111	315.846

Remarks

D. Acquisition Strategy

The Navy's acquisition strategy capitalizes on prior Rapid Deployment Capability efforts, while leveraging existing program investments. The acquisition strategy maintains commonality of MQ-8B and MQ-8C systems, payloads, avionics, software, and ancillary equipment where possible. The acquisition strategy supports the revised Capability Production Document. Initial Operational Capability of an MQ-8B-based system was achieved in 2QFY14 while IOC of an MQ-8C-based system onboard Littoral Combat Ship (LCS) is anticipated in 1QFY19. The maritime Radar has been competitively selected. The integration effort will require sole source contracts to the current prime Original Equipment Manufacturers (OEM) for the Tactical Control System (TCS) and the MQ-8 Fire Scout air vehicle. The Link-16 effort will require sole source contracts to the current prime OEM for the TCS, Link-16 J-series Message Implementation Plan, and the MQ-8 Fire Scout air vehicle. Existing Department of Defense contracts will be leveraged for Link-16 Terminal, Minotaur, and peripheral procurements.

E. Performance Metrics

Successfully provide an MQ-8C air vehicle that supports operational deployments. Successfully provide a Radar capability for operational deployments. Successfully achieve LCS integration. Successfully provide a Link-16 with In-Flight Target Update capability for operational deployments.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / *MQ-8 UAV*	Project (Number/Name) 2768 / *MQ-8 Fire Scout*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development (MQ-8)	C/CPIF	Northrop Grumman Corp : San Diego, CA	345.704	26.338	Nov 2017	0.392	Nov 2018	5.566	Jan 2020	-		5.566	92.273	470.273	474.845
Primary Hardware Development (MQ-8)	C/CPIF	Raytheon Corp : Falls Church, VA	24.251	2.537	Nov 2017	0.801	Nov 2018	0.650	Jan 2020	-		0.650	23.085	51.324	51.674
Primary Hardware Development (RADAR OEM)	C/CPIF	Leonardo MW : Edinburgh, United Kingdom	10.821	0.000		0.000		0.000		-		0.000	0.000	10.821	10.821
Primary Hardware Development (Minotaur)	C/BA	John Hopkins University : Laurel, MD	1.850	2.500	Jul 2018	0.000		0.000		-		0.000	6.500	10.850	10.328
Primary Hardware Development(Link-16)	C/CPIF	Northrop Grumman : San Diego, CA	0.000	0.000		0.000		4.500	Jun 2020	-		4.500	0.000	4.500	-
Primary Hardware Development(Link-16)	C/CPIF	Raytheon Corp : Falls Church, VA	0.000	0.000		0.000		1.000	Jun 2020	-		1.000	0.000	1.000	-
Primary Hardware Development(Link-16)	C/BA	John Hopkins University : Laurel, MD	0.000	0.000		0.000		1.000	Mar 2020	-		1.000	0.000	1.000	-
Primary Hardware Development(Link-16)	TBD	TBD : TBD	0.000	0.000		0.000		1.000	Mar 2020	-		1.000	0.000	1.000	-
		Subtotal	382.626	31.375		1.193		13.716		-		13.716	121.858	550.768	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics Support	Various	Various : Various	3.051	1.819	Nov 2017	0.385	Nov 2018	0.250	Dec 2019	-		0.250	10.431	15.936	-
		Subtotal	3.051	1.819		0.385		0.250		-		0.250	10.431	15.936	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 2768 / *MQ-8 Fire Scout*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWCAD : PAXRV, MD	16.275	12.569	Nov 2017	4.484	Nov 2018	3.500	Dec 2019	-		3.500	25.017	61.845	-
Operational Test & Evaluation/QRA	WR	NAWC : Various	10.434	7.047	Nov 2017	0.784	Nov 2018	3.603	Nov 2019	-		3.603	20.319	42.187	-
Prior Years T&E no longer funded in the FYDP	Various	Various : Various	1.646	0.000		0.000		0.000		-		0.000	0.000	1.646	-
		Subtotal	28.355	19.616		5.268		7.103		-		7.103	45.336	105.678	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Support	WR	NAWCAD : PAXRV, MD	54.937	7.116	Nov 2017	2.000	Nov 2018	5.146	Dec 2019	-		5.146	27.823	97.022	-
Program Management Support	Various	Various : Various	17.420	2.405	Nov 2017	0.712	Nov 2018	3.153	Dec 2019	-		3.153	10.336	34.026	-
Travel	WR	NAVAIR : PAXRV, MD	1.687	0.325	Nov 2017	0.285	Nov 2018	0.250	Dec 2019	-		0.250	2.554	5.101	-
Prior years Mgmt Svcs no longer funded in the FYDP	Various	Various : Various	2.457	0.000		0.000		0.000		-		0.000	0.000	2.457	-
		Subtotal	76.501	9.846		2.997		8.549		-		8.549	40.713	138.606	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	490.533	62.656		9.843		29.618		-		29.618	218.338	810.988	N/A

Remarks

OT&E includes MQ-8C FOT&E

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 2768 / *MQ-8 Fire Scout*

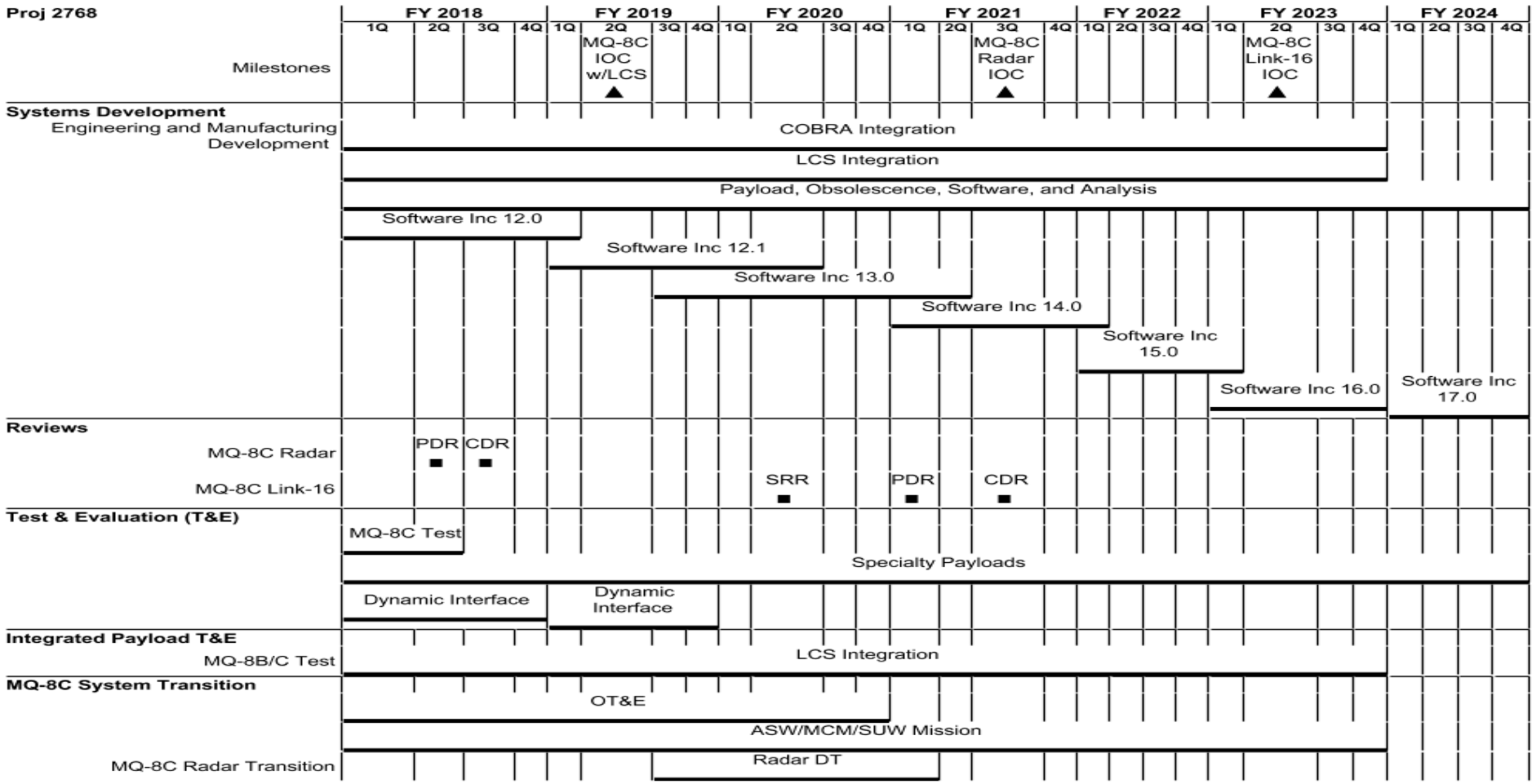

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 2768 / *MQ-8 Fire Scout*

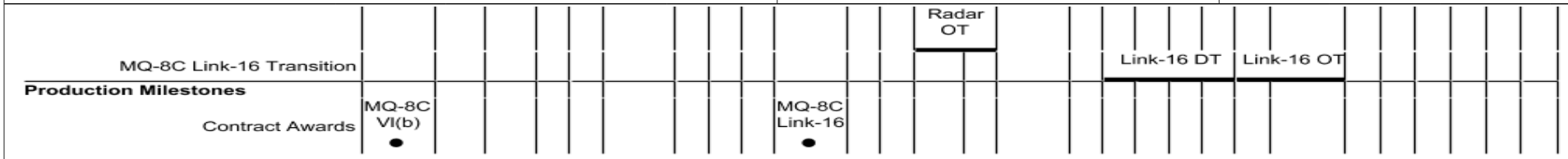

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 2768 / *MQ-8 Fire Scout*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2768				
Milestones: MQ-8 Initial Operational Capability (IOC) - MQ-8C Littoral Combat Ship (LCS)	2	2019	2	2019
Milestones: MQ-8C Radar IOC	3	2021	3	2021
Milestones: MQ-8C Initial Operational Capability (IOC) MQ-8C Link-16	2	2023	2	2023
Systems Development: Engineering and Manufacturing Development: Coastal Battlefield Reconnaissance and Analysis Integration (COBRA), BLK 1/2/3	1	2018	4	2023
Systems Development: Engineering and Manufacturing Development: Littoral Combat Ship (LCS) Integration	1	2018	4	2023
Systems Development: Engineering and Manufacturing Development: Payload, Obsolescence, Software, and Analysis	1	2018	4	2024
Systems Development: Engineering and Manufacturing Development: Software Increment 12.0	1	2018	1	2019
Systems Development: Engineering and Manufacturing Development: Software Increment 12.1	1	2019	2	2020
Systems Development: Engineering and Manufacturing Development: Software Increment 13.0	3	2019	2	2021
Systems Development: Engineering and Manufacturing Development: Software Increment 14.0	1	2021	1	2022
Systems Development: Engineering and Manufacturing Development: Software Increment 15.0	1	2022	1	2023
Systems Development: Engineering and Manufacturing Development: Software Increment 16.0	1	2023	4	2023
Systems Development: Engineering and Manufacturing Development: Software Increment 17.0	1	2024	4	2024
Reviews: MQ-8C Radar: Preliminary Design Review (PDR)	2	2018	2	2018

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 2768 / *MQ-8 Fire Scout*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Reviews: MQ-8C Radar: Critical Design Review (CDR)	3	2018	3	2018
Reviews: MQ-8C Link-16: System Requirement Review (SRR)	2	2020	2	2020
Reviews: MQ-8C Link-16: Preliminary Design Review (PDR)	1	2021	1	2021
Reviews: MQ-8C Link-16: Critical Design Review (CDR)	3	2021	3	2021
Test & Evaluation (T&E): MQ-8C Development Test	1	2018	2	2018
Test & Evaluation (T&E): Specialty Payloads	1	2018	4	2024
Test & Evaluation (T&E): MQ-8C Dynamic Interface (DI) Testing LCS Even Class	1	2018	4	2018
Test & Evaluation (T&E): MQ-8C Dynamic Interface (DI) Testing LCS Odd Class	1	2019	4	2019
Integrated Payload T&E: MQ-8B/C Test: Littoral Combat Ship (LCS) Integration	1	2018	4	2023
MQ-8C System Transition: Operational Test and Evaluation (OT&E)	1	2018	4	2020
MQ-8C System Transition: ASW/MCM/SUW Mission	1	2018	4	2023
MQ-8C System Transition: MQ-8C Radar Transition: Radar Developmental Test (DT)	3	2019	1	2021
MQ-8C System Transition: MQ-8C Radar Transition: Radar Operational Test (OT)	1	2021	2	2021
MQ-8C System Transition: MQ-8C Link-16 Transition: Link-16 Development Test (DT)	1	2022	4	2022
MQ-8C System Transition: MQ-8C Link-16 Transition: Link-16 Operational Test (OT)	1	2023	2	2023
Production Milestones: Contract Awards: Air Vehicles MQ-8C VI(b)	1	2018	1	2018
Production Milestones: Contract Awards: MQ-8C Link-16	2	2020	2	2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / *MQ-8 UAV*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	14.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.300
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MQ-8 Unmanned Air System program, popularly known as "Fire Scout", includes MQ-8B air vehicles (AV), MQ-8C AV, associated Mission Control Systems (MCS), Unmanned Aerial Vehicle Common Automatic Recovery Systems (UCARS), and payloads, to include Radar and weapons capabilities.

The MQ-8 System provides real-time and non-real-time Intelligence, Surveillance and Reconnaissance (ISR) data to tactical users without the use of manned aircraft or reliance on limited joint theater or national assets. The baseline MQ-8 can accomplish missions including over-the-horizon tactical reconnaissance, classification, targeting and laser designation and battle damage assessment (including voice communications relay). Development efforts respond to emerging fleet requirements through integration and improvements to Common Operational Picture capabilities, avionics, payloads, range, endurance, and targeting.

The MQ-8 launches and recovers vertically, and can operate from suitably-equipped air capable ships, as well as confined area land bases. Interoperability is achieved through the use of the Tactical Control System (TCS) software in the MCS, also referred to as a Ground Control Station (GCS), and through the use of the Tactical Common Data Link (TCDL). The data from the MQ-8 is provided through standard DoD Command, Control, Communications, Computers and ISR (C4ISR) system architectures and protocols.

A deployed MQ-8 system includes air vehicle(s), payloads (i.e. electro-optical/infrared/laser designator-range finder, Automated Identification System, voice communications relay, Radar, Weapons, and other specialty payloads), MCS (with TCS and TCDL integrated for interoperability), a UCARS for automatic launch and recovery, and associated spares and support equipment.

The MQ-8 Radar capability is the initial effort of the Surface Warfare (SUW) Increment to the MQ-8C. A non-developmental maritime Radar has been competitively selected for integration into the MQ-8C Fire Scout System. This system will provide MQ-8 operators enhanced situational awareness of the Recognized Maritime Picture (RMP) by providing multiple operational modes to include surface search, track, Inverse Synthetic Aperture Radar (ISAR) maritime target classification, and Synthetic Aperture Radar (SAR) target classification capabilities. The maritime Radar will be fully integrated with the MCS and ship's combat systems, providing data in standardized format for ease of dissemination to other users.

The MQ-8C Weapons Capability Integration study will evaluate weapons requirements outlined in the MQ-8C Capabilities Production Document (CPD). Weapons trade study will be conducted to assess the mission effectiveness and potential impacts of adding candidate weapons systems to the MQ-8C Fire Scout in a Surface Warfare (SUW) scenario. Additional trade studies will be conducted to analyze weapons platform integration, software architecture, stores management, and air vehicle structural requirements for addition of the MQ-8C Weapons capability.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Radar Integration ***FY 2018 Accomplishments:*** N/A ***FY 2019 Plans:*** FY 2019 Congressional Add funding provided to support MQ-8C Radar hardware, software modifications, payload integration, cyber vulnerability closure, and related MQ-8C Air Vehicle (AV) safety capability improvements. Funding supports integration of the selected Radar with the MQ-8C AV and Mission Control Station (MCS), completes qualification of the selected Radar for the MQ-8C operational environment, and initiates Developmental Testing (DT) for Radar hardware and software modification integration on the MQ-8C AV. Provides engineering, program technical management, logistics and T&E support of the MQ-8C AV and Radar programs.	0.000	5.500
Congressional Add: Weapons Capability Integration ***FY 2018 Accomplishments:*** N/A ***FY 2019 Plans:*** FY 2019 Congressional Add funding provided to support MQ-8C Weapons Capability Integration studies and evaluate weapons requirements outlined in the MQ-8C Capabilities Production Document (CPD). A weapons trade study will be conducted to assess the mission effectiveness and potential impacts of adding candidate weapons systems to the MQ-8C AV in a surface warfare scenario. Additional trade studies will be conducted to analyze weapons platform integration, software architecture, stores management, and MQ-8C AV structural requirements for the addition of weapons capabilities.	0.000	8.800
Congressional Adds Subtotals	0.000	14.300

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Successfully provide MQ-8 Radar capability as part of the Surface Warfare (SUW) Increment to the MQ-8C. The MQ-8C Weapons capability integration study will evaluate weapons requirements outlined in the MQ-8C Capabilities Production Document (CPD).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / *MQ-8 UAV*	Project (Number/Name) 9999 / *Congressional Adds*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development (Weapons)	C/CPIF	NGC : San Diego, CA	0.000	0.000		1.000	Jun 2019	0.000		-		0.000	0.000	1.000	-
Primary Hardware Development (Weapons)	C/CPIF	Raytheon Corp : Falls Church, VA	0.000	0.000		1.000	Jun 2019	0.000		-		0.000	0.000	1.000	-
Primary Hardware Development (Weapons)	TBD	Bell : Not Specified	0.000	0.000		0.500	Jun 2019	0.000		-		0.000	0.000	0.500	-
Primary Hardware Development (Weapons)	C/BA	John Hopkins University : Laurel, MD	0.000	0.000		0.500	Jun 2019	0.000		-		0.000	0.000	0.500	-
Primary Hardware Development (Weapons)	TBD	TBD : TBD	0.000	0.000		1.500	Jun 2019	0.000		-		0.000	0.000	1.500	-
Primary Hardware Development (Radar)	TBD	TBD : TBD	0.000	0.000		1.460	Jun 2019	0.000		-		0.000	0.000	1.460	-
		Subtotal	0.000	0.000		5.960		0.000		-		0.000	0.000	5.960	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Logistics (Radar)	WR	Various : Various	0.000	0.000		0.240	Feb 2019	0.000		-		0.000	0.000	0.240	-
		Subtotal	0.000	0.000		0.240		0.000		-		0.000	0.000	0.240	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development & Test Eval (Radar)	WR	NAWCAD : Pax Rvr, MD	0.000	0.000		3.800	Feb 2019	0.000		-		0.000	0.000	3.800	-
		Subtotal	0.000	0.000		3.800		0.000		-		0.000	0.000	3.800	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305231N / *MQ-8 UAV*	Project (Number/Name) 9999 / *Congressional Adds*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Governement Engineering (Weapons)	WR	Various : Various	0.000	0.000		4.015	Feb 2019	0.000		-		0.000	0.000	4.015	-
Travel	C/BA	NAVAIR : Patuxent Rvr, MD	0.000	0.000		0.285	Sep 2019	0.000		-		0.000	0.000	0.285	-
		Subtotal	0.000	0.000		4.300		0.000		-		0.000	0.000	4.300	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		14.300		0.000		-		0.000	0.000	14.300	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 9999 / *Congressional Adds*

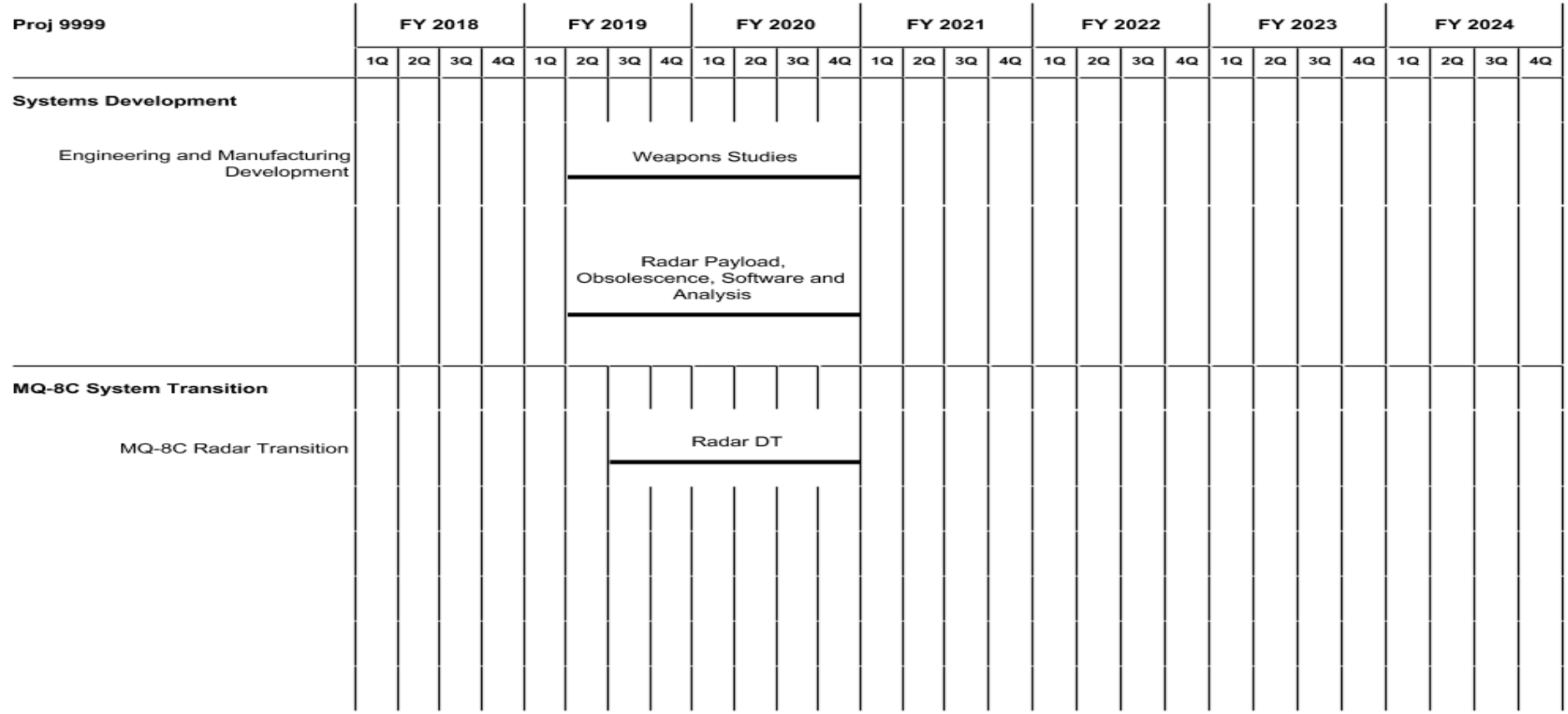

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305231N / *MQ-8 UAV*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Systems Development: Engineering and Manufacturing Development: Weapons Studies (Weapons)	2	2019	4	2020
Systems Development: Engineering and Manufacturing Development: Radar Payloads, Obsolescence, Software and Analysis	2	2019	4	2020
MQ-8C System Transition: MQ-8C Radar Transition: Radar Developmental Test (DT)	3	2019	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305232M *I RQ-11 UAV*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	3.442	2.002	0.524	0.509	-	0.509	0.522	0.536	0.558	0.569	Continuing	Continuing
2292: *Unmanned Air Systems (Intel)*	3.442	2.002	0.524	0.509	-	0.509	0.522	0.536	0.558	0.569	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Small Unit Remote Scouting System (SURSS) - The SURSS program procures unmanned aircraft systems (UAS) to provide battalion/company/detachment level units with scalable airborne reconnaissance and surveillance capabilities to aid in detecting, identifying, engaging, or avoiding enemy units. Multiple systems, to include RQ-12 Wasp, RQ-11 Raven, RQ-20 Puma and various Nano/VTOL UAS's are required to meet various operational requirements delineated in the Operational Requirements Document. They continue to be planned as the current solutions for Group 1 and Group 2 capability needs while both Navy and Marine Corps finalize the transition of revised requirements to address Intelligence, Surveillance, and Reconnaissance (AISR) Capability Set via a new Capability Development Document (CDD), the intended successor to the current ORD. The new CDD shall incorporate unique mission kits, mission payloads, air vehicle enhancements, and modifications of UAS and related ground control stations for the family of Group 1 tactical UAS systems including Group 1 Short Range/Short Endurance (SR/SE), Group 1 Medium Range/Medium Endurance (MR/ME), and Group1/Group 2 Long Range/Long Endurance (LR/LE). The SURSS program also conducts Field User Evaluations (FUEs) to support Universal Urgent Needs Statements (UUNS) that inform future USMC system procurement and ensure Marines have the most current technology available.

Development efforts for SURSS are ongoing in order to keep Group I-II UAS capability in line with emerging technologies and threats. SURSS is developing a Single Operator Man-Portable Ground Control System (SOMGCS) to integrate with the Target Handoff System (THS) to improve portability and digital interoperability. SOMGCS/THS provides enhanced opportunities to detect irregular and asymmetric threats in a variety of domains, to include urban domains, providing the warfighter with enhanced situational awareness and understanding. SOMGCS/THS reduces the size, weight, and man power required to operate a SURSS GCS, increases the mobility of the operator, and improves digital interoperability. SOMGCS/THS is fully mobile and can be attached to the operator while the fielded GCS requires setup at a static location. Mobile ad-hoc network (MANET) communication relay, laser marker, and Signals Intelligence (SIGINT) payloads integration are being developed to improve effectiveness and interoperability to better support the warfighter. Improvements such as solar technology, improved batteries, software upgrades, and alternative repair components are being explored to improve effectiveness, reliability, and reduce support costs.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy* / BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0305232M / *RQ-11 UAV*			
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	2.022	0.524	0.509	-	0.509
Current President's Budget	2.002	0.524	0.509	-	0.509
Total Adjustments	-0.020	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.020	0.000			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Change Summary Explanation

The FY 2020 funding request was reduced by $0.509 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305232M / *RQ-11 UAV*	Project (Number/Name) 2292 / *Unmanned Air Systems (Intel)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2292: *Unmanned Air Systems (Intel)*	3.442	2.002	0.524	0.509	-	0.509	0.522	0.536	0.558	0.569	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Small Unit Remote Scouting System (SURSS) - The SURSS program procures unmanned aircraft systems (UAS) to provide battalion/company/detachment level units with scalable Airborne Intelligence, Surveillance and Reconnaissance (AISR) capabilities to aid in detecting, identifying, engaging, and/or avoiding enemy units. Currently procured RQ-12 Wasp, RQ-11 Raven, RQ-20 Puma and various Nano/Vertical Takeoff & Landing (VTOL) UASs meet validated operational requirements delineated in the Operational Requirements Document (ORD). They continue to be planned as the current solutions for Group 1 and Group 2 capability needs while both Navy and Marine Corps finalize the transition of revised requirements to address the AISR capability set via a new Capability Development Document (CDD) with the intended successor to the current ORD. The new CDD shall incorporate unique mission kits, mission payloads, air vehicle enhancements, and modifications of UAS and related ground control stations for the family of Group 1 tactical UAS systems including Group 1 Short Range/Short Endurance (SR/SE), Group 1 Medium Range/ Medium Endurance (MR/ME), and Group1/Group 2 Long Range/Long Endurance (LR/LE). Group 1 UAS are small systems, less than 20 pounds in weight and Group 2 are medium systems, between 21 pounds and 55 pounds in weight.

The SURSS program also conducts Field User Evaluations (FUEs) to support Universal Urgent Needs Statements (UUNS) that inform future USMC system procurement the most current technology available. A Single Operator Man-Portable Ground Control System (GCS) / Target Handoff System(SOMGCS/THS) capability provides enhanced opportunities to detect irregular and asymmetric threats in a variety of domains, to include urban domains, providing the warfighter with enhanced situational awareness and understanding. A SOMGCS/THS capability reduces the size, weight, and manpower required to operate a SURSS GCS, increases the mobility of the operator, and improves digital interoperability. A SOMGCS/THS capability shall be fully mobile and can be attached to the operator while the fielded GCS requires setup at a static location.

SR/SE capabilities are transitioning with revised requirements vice the existing ORD (Block 0) requirements to a next generation capability: Existing ORD (Block 0) capabilities are satisfied by the RQ-12A Wasp UAS. Wasp is a small, all environment UAS with a wingspan of 3.3 feet weight of 2.25 pounds and endurance of 60 minutes. The payload consists of a gimbaled turret with Electro Optical/Infrared (EO/IR) sensor. It allows maximum portability and provides near-real-time reconnaissance required by the platoon and rifle squad. SR/SE (ORD Block 0) assets reduce the request-to-response timeframe for ISR services by eliminating delays or denials for ISR coverage due to an imbalance of other UAS assets that might otherwise be available.

MR/ME capabilities are transitioning with revised requirements vice the existing ORD (Block 1) requirements to a next generation capability: Existing ORD (Block 1) capabilities are satisfied by the RQ-11B Raven UAS. Raven is a small UAS with a wingspan of 4.6 feet, weight of 5 pounds and endurance of 90 minutes. Raven employs a gimbaled EO/IR sensor. Raven provides the company level unit an organic, near-real-time ISR capability that facilitates rapid battlefield decision making.

LR/LE capabilities are transitioning with revised requirements vice the existing ORD (Block 2) requirements to a next generation capability. Existing ORD (Block 2) capabilities are satisfied by the RQ-20B Puma UAS. Puma is an all environment UAS with a wingspan of 9.2 feet, weight of 13 pounds and endurance of 2.5 hours. The

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305232M / *RQ-11 UAV*	**Project (Number/Name)** 2292 / *Unmanned Air Systems (Intel)*

Puma has demonstrated ranges of up to 28 kilometers. The standard payload consists of a gimbaled turret with an EO/IR sensor; a Signals Intelligence payload is also available. Puma provides an organic, persistent ISR capability to battalion level units, Route Clearance Platoons (RCP) and Combat Logistics Patrols (CLP) to enhance force protection and detect Improvised Explosive Devices (IEDs).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development and Support	1.086	0.256	0.259	0.000	0.259
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue and complete integration of electronic warfare capability (SIGINT) kit, laser marker, and Mobile Ad hoc Networks communication relay (MANET) with RQ-20 PUMA. -Initiate software development for SOMGCS/THS to improve digital interoperability with RQ-20 PUMA.					
FY 2020 Base Plans: -Initiate integration of electronic warfare capability (SIGINT) kit, laser marker, and Mobile Ad hoc Networks communication relay (MANET). -Complete software development for SOMGCS/THS to improve digital interoperability with RQ-20 PUMA.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement: No significant change.					
Title: Test and Evaluation (Operational Assessment)	0.916	0.268	0.250	0.000	0.250
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue operational assessment of MANET, and Laser Marker for RQ-20 PUMA. -Continue assessment of low cost, commercial available Unmanned Aerial Systems to inform future procurements, and determine potential adversary capabilities. -Complete operational assessment of SOMGCS for RQ-20 PUMA.					
FY 2020 Base Plans: -Continue operational assessment of MANET, and Laser Marker for future platforms. -Continue assessment of low cost, commercial available Unmanned Aerial Systems to inform future procurements, and determine potential adversary capabilities.					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305232M / *RQ-11 UAV*	**Project (Number/Name)** 2292 / *Unmanned Air Systems (Intel)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY2020 funding request was decreased by $0.018M due to SOMGCS effort completing in FY19.					
Accomplishments/Planned Programs Subtotals	2.002	0.524	0.509	0.000	0.509

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4757: *RQ-11 UAV*	10.154	3.848	34.711	-	34.711	39.845	30.623	18.449	19.353	Continuing	Continuing

Remarks

D. Acquisition Strategy

The program office is pursuing a rapid acquisition approach to quickly field new technology and capabilities to the warfighter. The strategy is to use evolutionary acquisition with incremental developments to meet the final desired Small Unit Remote Scouting System (SURSS) requirements (Joint USMC/USA/SOCOM capabilities). The next increment will involve an evolution to a Group 1-2 (Family of System) individually capable of executing requirements for long, medium and short range missions in fulfillment of the SURSS requirement and the transition to the capability set as determined to meet the Next Generation requirements. A comprehensive review of the Next Generation service small UAS needs and requirements are being generated at CD&I to update current requirements documents.

E. Performance Metrics

Successful operational test of MANET, SIGINT and Laser Marker payloads.
Successful operational test of SOMGCS.
Fielding of the SOMGCS, MANET, SIGINT and Laser Marker payloads in accordance with planned schedule.
Demonstrated improvements in Digital Interoperability.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305232M / *RQ-11 UAV*	Project (Number/Name) 2292 / *Unmanned Air Systems (Intel)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative Funding	Various	Various : Various	1.342	0.000		0.000		0.000		-		0.000	0.000	1.342	-
SOMGCS/THS Software Integration	WR	NAWCWD : China Lake, CA	0.435	0.224	Dec 2017	0.076	Dec 2018	0.075	Dec 2019	-		0.075	Continuing	Continuing	Continuing
MANET Integration	WR	NAWCAD : Pax River, MD	0.450	0.361	Dec 2017	0.085	Dec 2018	0.089	Dec 2019	-		0.089	Continuing	Continuing	Continuing
Laser Marker Integration	WR	NAWCAD : Pax River, MD	0.000	0.362	Dec 2017	0.095	Dec 2018	0.095	Dec 2019	-		0.095	Continuing	Continuing	Continuing
		Subtotal	2.227	0.947		0.256		0.259		-		0.259	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Analysis	WR	NAWCAD : Pax River, MD	1.215	0.139	Nov 2017	0.000		0.000		-		0.000	0.000	1.354	-
		Subtotal	1.215	0.139		0.000		0.000		-		0.000	0.000	1.354	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
COTS UAS Analysis	WR	NAWCAD : Pax River, MD	0.000	0.250	Jan 2018	0.000		0.000		-		0.000	0.000	0.250	-
SOMGCS/THS Operational Assessment	WR	NAWCAD : Pax River, MD	0.000	0.225	Jan 2018	0.083	Jan 2019	0.080	Jan 2020	-		0.080	0.000	0.388	-
Laser Marker Operational Assessment	WR	NAWCAD : Pax River, MD	0.000	0.283	Jan 2018	0.090	Jan 2019	0.085	Jan 2020	-		0.085	0.000	0.458	-
MANET Operational Assessment	WR	NAWCAD : Pax River, MD	0.000	0.158	Jan 2018	0.095	Jan 2019	0.085	Jan 2020	-		0.085	0.000	0.338	-
		Subtotal	0.000	0.916		0.268		0.250		-		0.250	0.000	1.434	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305232M / *RQ-11 UAV*	Project (Number/Name) 2292 / *Unmanned Air Systems (Intel)*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.442	2.002		0.524		0.509		-		0.509	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305232M / *RQ-11 UAV*	**Project (Number/Name)** 2292 / *Unmanned Air Systems (Intel)*

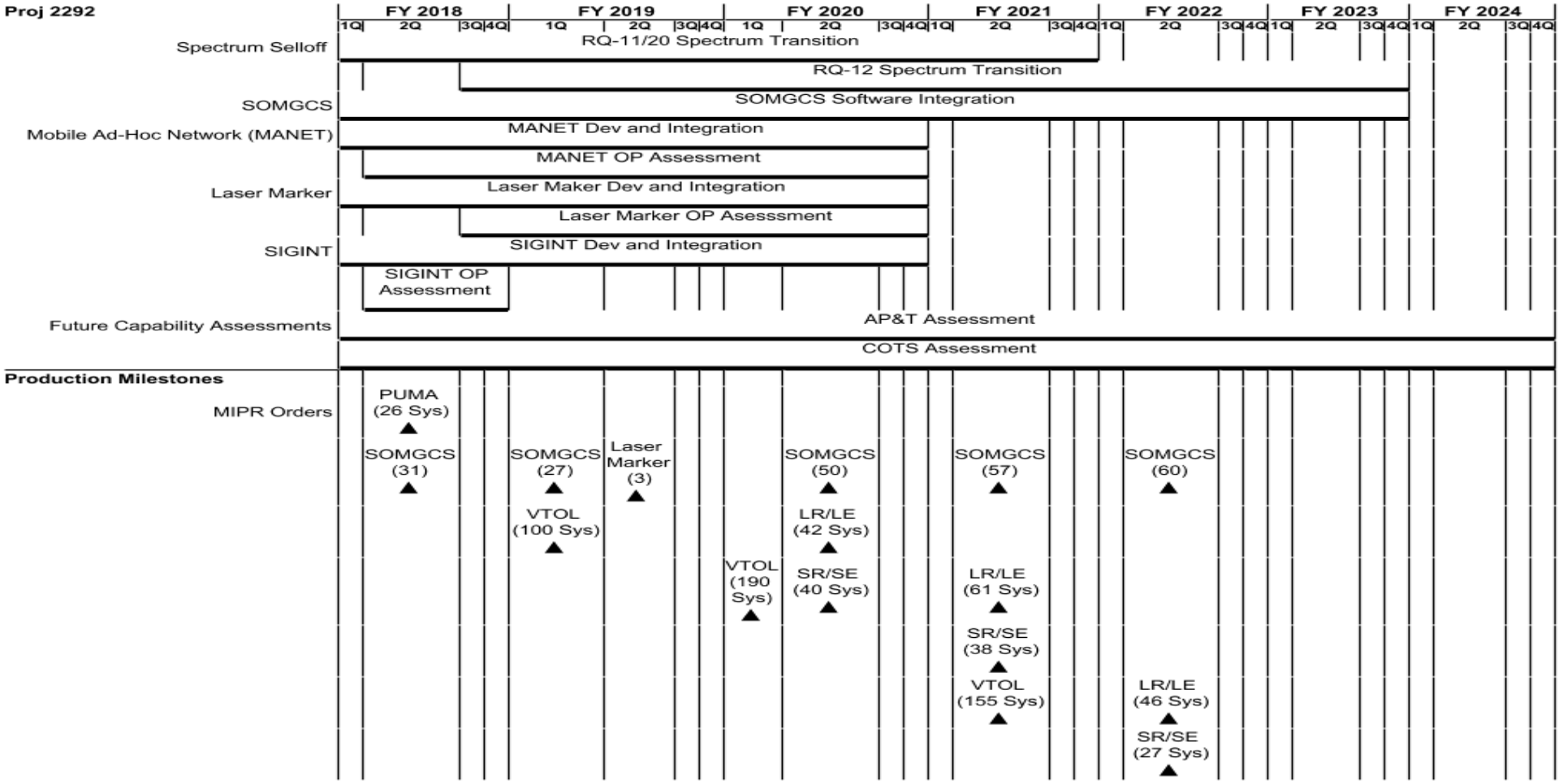
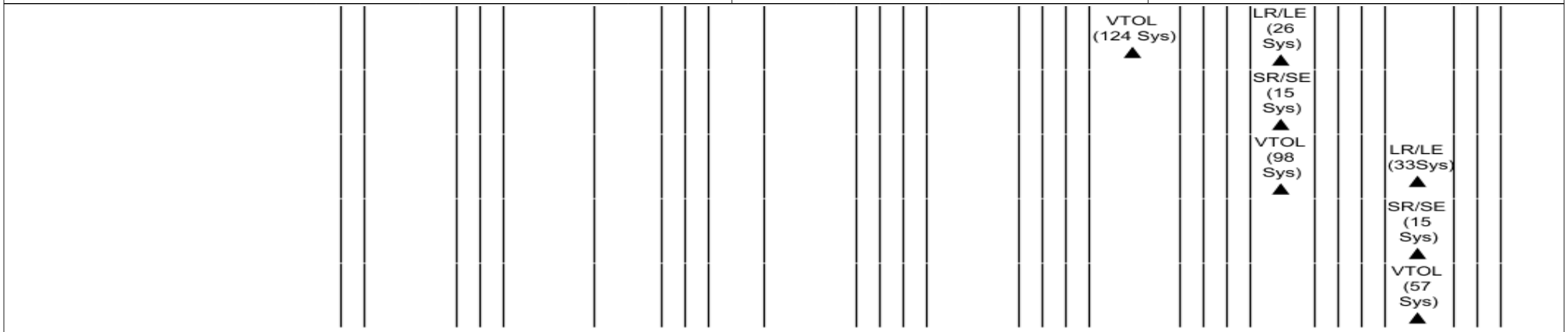


Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305232M / *RQ-11 UAV*	**Project (Number/Name)** 2292 / *Unmanned Air Systems (Intel)*



2020PB - 0305232M - 2292

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305232M / *RQ-11 UAV*	**Project (Number/Name)** 2292 / *Unmanned Air Systems (Intel)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2292				
Spectrum Selloff: Army Led RQ-11/RQ-20 Spectrum Transition	1	2018	4	2021
Spectrum Selloff: Marine Corps Led RQ-12 Spectrum Transition	3	2018	4	2023
SOMGCS: SOMGCS/THS Software Integration	1	2018	4	2023
Mobile Ad-Hoc Network (MANET): MANET Development and Integration	1	2018	4	2020
Mobile Ad-Hoc Network (MANET): MANET Operational Assessment	2	2018	4	2020
Laser Marker: Laser Marker Development and Integration Verification	1	2018	4	2020
Laser Marker: AV Commercial Laser Marker Operational Assessment	3	2018	4	2020
SIGINT: SIGINT Development and Integration	1	2018	4	2020
SIGINT: Signals Operational Asssessment	2	2018	4	2018
Future Capability Assessments: Advanced Payload and Technology Assessment	1	2018	4	2024
Future Capability Assessments: Low Cost COTS Assessment	1	2018	4	2024
Production Milestones: MIPR Orders: FY18 PUMA	2	2018	2	2018
Production Milestones: MIPR Orders: FY18 SOMGCS	2	2018	2	2018
Production Milestones: MIPR Orders: FY19 SOMGCS/THS	1	2019	1	2019
Production Milestones: MIPR Orders: FY19 Laser Marker	2	2019	2	2019
Production Milestones: MIPR Orders: FY20 SOMGCS/THS	2	2020	2	2020
Production Milestones: MIPR Orders: FY21 SOMGCS/THS	2	2021	2	2021
Production Milestones: MIPR Orders: FY22 SOMGCS/THS	2	2022	2	2022
Production Milestones: MIPR Orders: FY19 VTOL	1	2019	1	2019
Production Milestones: MIPR Orders: FY20 LR/LE	2	2020	2	2020
Production Milestones: MIPR Orders: FY20 SR/SE	2	2020	2	2020
Production Milestones: MIPR Orders: FY20 VTOL	1	2020	1	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305232M / *RQ-11 UAV*	**Project (Number/Name)** *2292 / Unmanned Air Systems (Intel)*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: MIPR Orders: FY21 LR/LE	2	2021	2	2021
Production Milestones: MIPR Orders: FY21 SR/SE	2	2021	2	2021
Production Milestones: MIPR Orders: FY21 VTOL	2	2021	2	2021
Production Milestones: MIPR Orders: FY22 LR/LE	2	2022	2	2022
Production Milestones: MIPR Orders: FY22 SR/SE	2	2022	2	2022
Production Milestones: MIPR Orders: FY22 VTOL	2	2022	2	2022
Production Milestones: MIPR Orders: FY23 LR/LE	2	2023	2	2023
Production Milestones: MIPR Orders: FY23 SR/SE	2	2023	2	2023
Production Milestones: MIPR Orders: FY23 VTOL	2	2023	2	2023
Production Milestones: MIPR Orders: FY24 LR/LE	2	2024	2	2024
Production Milestones: MIPR Orders: FY24 SR/SE	2	2024	2	2024
Production Milestones: MIPR Orders: FY24 VTOL	2	2024	2	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305234N *I (U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	79.040	4.827	5.265	11.545	-	11.545	8.895	6.126	6.083	6.203	Continuing	Continuing
3192: *RQ-21 BLACKJACK*	79.040	4.827	5.265	11.545	-	11.545	8.895	6.126	6.083	6.203	Continuing	Continuing

A. Mission Description and Budget Item Justification

The RQ-21A BLACKJACK (formerly known as The Small Tactical Unmanned Aircraft System (STUAS)) is a combined United States Navy (USN) and United States Marine Corps (USMC) program that provides persistent maritime and land-based tactical Intelligence, Surveillance, and Reconnaissance/Target Acquisition support for tactical level maneuver decisions and unit level force defense/force protection for Naval amphibious assault ships (multi-ship classes) and Navy and Marine land forces. This system will support Naval Missions such as building the Recognized Maritime Picture, Maritime Security Operations, Maritime Interdiction Operations, and provide support for Naval Units operating from sea/shore in Overseas Contingency Operations. This submission is the USNs portion of the program and has been coordinated with the USMC budget submission PE 0305239M (RQ-21A).

The RQ-21A BLACKJACK system will continue to evolve and upgrade capabilities to satisfy capabilities shortfalls, new requirements, and reliability, maintainability and safety issues. Upgraded capabilities may include Navy Command and Control integration, Weapons Integration, Heavy Fuel Engine, Laser Designator, Frequency Agile Communications Relay, Digital Common Data Link, and cyclic refresh of the Electro-Optical/Infrared camera. RQ-21A BLACKJACK will also continue to expand its shipboard capability across new ship classes.

This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full-rate production and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	4.835	5.360	5.103	-	5.103
Current President's Budget	4.827	5.265	11.545	-	11.545
Total Adjustments	-0.008	-0.095	6.442	-	6.442
• Congressional General Reductions	-	-0.095			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.008	0.000			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	6.494	-	6.494
• Rate/Misc Adjustments	0.000	0.000	-0.052	-	-0.052

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305234N *I (U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*

Change Summary Explanation

The FY 2020 funding request was reduced by $0.458M to account for the availability of prior year execution balances.

FY 2020 increase of $6.1 million in funding for the development of the vertical takeoff and landing (VTOL) kit for the RQ-21A.

Note 1: FOT&E periods updated with additional details and events added in FY 2023 and FY 2024.
Note 2: IDIQ Contract Award schedule milestone added to the schedule.
Note 3: Correction of Deficiencies Modifications added to the schedule.
Note 4: Capability Upgrade Development added to the schedule.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305234N / *(U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*	Project (Number/Name) 3192 / *RQ-21 BLACKJACK*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3192: *RQ-21 BLACKJACK*	79.040	4.827	5.265	11.545	-	11.545	8.895	6.126	6.083	6.203	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The RQ-21A BLACKJACK (formerly known as The Small Tactical Unmanned Aircraft System (STUAS)) is a combined United States Navy (USN) and United States Marine Corps (USMC) program that provides persistent maritime and land-based tactical Intelligence, Surveillance, and Reconnaissance/Target Acquisition support for tactical level maneuver decisions and unit level force defense/force protection for Naval amphibious assault ships (multi-ship classes) and Navy and Marine land forces. This system will support Naval Missions such as building the Recognized Maritime Picture, Maritime Security Operations, Maritime Interdiction Operations, and provide support for Naval Units operating from sea/shore in Overseas Contingency Operations. This submission is the USNs portion of the program and has been coordinated with the USMC budget submission PE 0305239M (RQ-21A).

The RQ-21A BLACKJACK system will continue to evolve and upgrade capabilities to satisfy capabilities shortfalls, new requirements, and reliability, maintainability and safety issues. Upgraded capabilities may include Navy Command and Control integration, Weapons Integration, Heavy Fuel Engine, Laser Designator, Frequency Agile Communications Relay, Digital Common Data Link, new launch and recovery methods, parts durability and manufacturability, and cyclic refresh of the Electro-Optical/ Infrared (EO/IR) camera. RQ-21A BLACKJACK will also continue to expand its shipboard capability across new ship classes.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Upgrade Efforts	1.523	2.157	8.152	0.000	8.152
Articles:	-	-	-	-	-
FY 2019 Plans: RQ-21A Blackjack Corrective Action Program will continue the correction of deficiencies from the IOT&E Report. The program will continue software engineering and development for block software updates. The program will continue to assess improvements to the fuel tank, maximum gross takeoff weight, launch and recovery systems, parts durability and manufacturability, avionics module, and other components. Begin implementation of block upgrade plan for the RQ-21A system.					
FY 2020 Base Plans: The program will perform investigations, studies, and prototype efforts for a Vertical Takeoff and Landing (VTOL) capability for RQ-21A platform, which will eliminate the requirement for large and costly launch and recovery equipment and allow for expeditionary employment, not including maritime applications. Development of a VTOL kit for RQ-21A supports combat operations with the required expeditionary capability to support remote operations and maintain a minimal physical and manpower footprint. The program will improve the ability of					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305234N / *(U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
the RQ-21A air vehicle to recover in a GPS denied environment and continue upgrades to reduce recovery damage, increase Propulsion Module Unit performance and reliability, and improved turret optics. The program will perform software development to correct deficiencies from test as well as enable additional capabilities such as VTOL and enable a block upgrade of multiple system components at a time. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2020 funding increase supports increase in development costs for the VTOL baseline efforts.					
Title: Engineering Support ***Articles:*** ***FY 2019 Plans:*** Continue Government Engineering Technical Support, Test and Evaluation, other Government Support, Contract Support Services, Program Management Support, and program related travel in support of correction of deficiencies and upgrade efforts. ***FY 2020 Base Plans:*** Continue Government Engineering Technical Support, Test and Evaluation, other Government Support, Contract Support Services, Program Management Support, and program related travel in support of correction of deficiencies and upgrade efforts. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in Operational Test & Evaluation (OT&E) efforts related to the completion of correction of deficiencies.	3.304 -	3.108 -	3.393 -	0.000 -	3.393 -
Accomplishments/Planned Programs Subtotals	4.827	5.265	11.545	0.000	11.545

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0444: *STUASLO*	9.980	46.931	43.819	7.921	51.740	33.939	31.350	30.421	29.107	0.000	426.922
• RDTEN/0305239M: *(U)RQ-21A*	10.500	6.000	10.914	-	10.914	10.908	11.303	10.527	10.737	Continuing	Continuing
• PMC/4737: *RQ-21 UAS*	82.641	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	397.038

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305234N / *(U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/7000: *Spares and Repair Parts*	11.027	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	37.401

Remarks

D. Acquisition Strategy

The program office has utilized a competitive acquisition approach for award of the Engineering and Manufacturing Development effort to field a capability that meets threshold requirements. Low Rate Initial Production (LRIP) test article was utilized to successfully complete Initial Operational Test and Evaluation (IOT&E). LRIP continues through Future payload upgrades and development shall be competitively sourced or procured via Government Laboratories with Insitu, the prime contractor, performing integration efforts as required.

E. Performance Metrics

Attainment of Full Rate Production, correction of deficiencies from the IOT&E Report, and attainment of United States Marine Corps and United States Navy Full Operational Capability in accordance with the approved schedule.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305234N / *(U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Upgrade Efforts/Correction of Deficiencies	C/BOA	Insitu, Inc : Bingen, WA	6.534	1.523	Jul 2018	2.157	Jul 2019	8.152	Mar 2020	-		8.152	Continuing	Continuing	Continuing
Prior year Prod Devt no longer funded in the FYDP	Various	Various : Various	29.125	0.000		0.000		0.000		-		0.000	0.000	29.125	-
		Subtotal	35.659	1.523		2.157		8.152		-		8.152	Continuing	Continuing	N/A

Remarks

Product development corresponds to R-2A Upgrade Efforts.
Increased costs associated with Upgrade Efforts/Correction of Deficiencies is due to initiating VTOL development efforts.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Engineering Support	WR	NAWC-WD : China Lake, CA	11.516	1.600	Dec 2017	1.416	Dec 2018	1.385	Dec 2019	-		1.385	Continuing	Continuing	Continuing
Government Engineering Support	WR	NAWC-AD : Patuxent River, MD	13.183	0.545	Dec 2017	0.554	Dec 2018	0.865	Dec 2019	-		0.865	Continuing	Continuing	Continuing
Prior year Support no longer funded in the FYDP	Various	Various : Various	8.482	0.000		0.000		0.000		-		0.000	0.000	8.482	-
		Subtotal	33.181	2.145		1.970		2.250		-		2.250	Continuing	Continuing	N/A

Remarks

Support is included within R-2A Engineering Support.
Increased costs associated with Government Engineering Support is due to increased engineering efforts associated with the development of the VTOL capability.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	OPTEVFOR : Norfolk, VA	2.912	0.391	Jul 2018	0.400	Jul 2019	0.408	Jul 2020	-		0.408	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305234N / *(U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*	Project (Number/Name) 3192 / *RQ-21 BLACKJACK*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Operational Test & Evaluation	WR	OPTEVFOR : Norfolk, VA	0.267	0.040	Dec 2017	0.040	Dec 2018	0.040	Dec 2019	-		0.040	Continuing	Continuing	Continuing
		Subtotal	3.179	0.431		0.440		0.448		-		0.448	Continuing	Continuing	N/A

Remarks

Test and Evaluation is included within R-2A Engineering Support.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	MIPR	DTIC : FT. Belvoir, VA	2.902	0.235	Mar 2018	0.235	Mar 2019	0.235	Mar 2020	-		0.235	Continuing	Continuing	Continuing
Program Management Support	C/CPFF	Bowhead : Patuxent River, MD	1.371	0.443	Jan 2018	0.415	Jan 2019	0.410	Jan 2020	-		0.410	Continuing	Continuing	Continuing
Travel	WR	Various : Various	0.399	0.050	Oct 2017	0.048	Oct 2018	0.050	Oct 2019	-		0.050	Continuing	Continuing	Continuing
Prior Year Mgmt Svcs no longer funded in the FYDP	Various	Various : Various	2.349	0.000		0.000		0.000		-		0.000	0.000	2.349	Continuing
		Subtotal	7.021	0.728		0.698		0.695		-		0.695	Continuing	Continuing	N/A

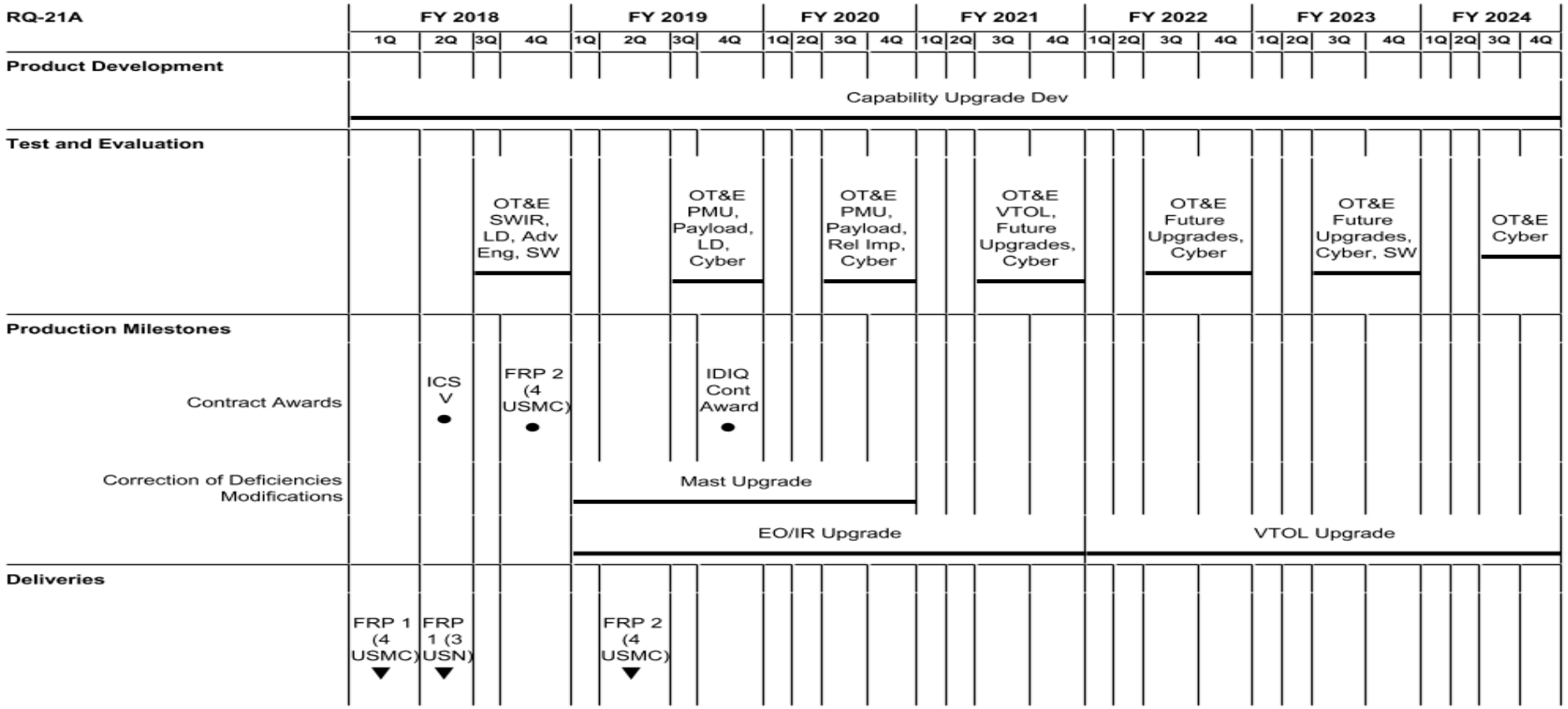
Remarks

Management Services is included within R-2A Engineering Support.

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	79.040	4.827		5.265		11.545		-		11.545	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305234N / *(U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*



2020PB - 0305234N - 3192

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305234N / *(U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
RQ-21A				
Product Development: Capability Upgrade Development	1	2018	4	2024
Test and Evaluation: Follow-on Test and Evaluation - SWIR, LD, Adv Engine, Software upgrades	3	2018	4	2018
Test and Evaluation: Follow-on Test and Evaluation - Propulsion Module Unit, Payload, LD, Cybersecurity	3	2019	4	2019
Test and Evaluation: Follow-on Test and Evaluation - Propulsion Module Unit, Payload, Reliability Improvements, Cybersecurity	3	2020	4	2020
Test and Evaluation: Follow-on Test and Evaluation - VTOL, Future Upgrades, Cybersecurity	3	2021	4	2021
Test and Evaluation: Follow-on Test and Evaluation - Future Upgrades, Cybersecurity	3	2022	4	2022
Test and Evaluation: Follow-on Test and Evaluation - Future Upgrades, Cybersecurity, Software Upgrades	3	2023	4	2023
Test and Evaluation: Follow-on Test and Evaluation - Cybersecurity	3	2024	4	2024
Production Milestones: Contract Awards: Full-Rate Production Contract Award 2	4	2018	4	2018
Production Milestones: Contract Awards: ICS Option Award 3	2	2018	2	2018
Production Milestones: Contract Awards: IDIQ Contract Award	4	2019	4	2019
Production Milestones: Correction of Deficiencies Modifications: Mast Upgrade	1	2019	4	2020
Production Milestones: Correction of Deficiencies Modifications: EO/IR Upgrade	1	2019	4	2021
Production Milestones: Correction of Deficiencies Modifications: VTOL Upgrade	1	2022	4	2024
Deliveries: FRP Lot 1 USMC	1	2018	1	2018
Deliveries: FRP Lot 1 USN	2	2018	2	2018
Deliveries: FRP Lot 2 USMC	2	2019	2	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305239M *I (U)RQ-21A*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	80.659	10.500	6.000	10.914	-	10.914	10.908	11.303	10.527	10.737	Continuing	Continuing
2298: *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*	80.659	8.810	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	89.469
3192: *RQ-21 BLACKJACK*	0.000	0.000	6.000	10.914	-	10.914	10.908	11.303	10.527	10.737	Continuing	Continuing
9999: *Congressional Adds*	0.000	1.690	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.690

A. Mission Description and Budget Item Justification

The RQ-21A program provides persistent maritime and land-based tactical Reconnaissance, Surveillance and Target Acquisition (RSTA) data collection and dissemination capability to the war fighter. For the United States Marine Corps (USMC), RQ-21A provides the Marine Expeditionary Force and subordinate commands (divisions and regiments) with a dedicated, organic Intelligence, Surveillance, and Reconnaissance (ISR) capability delivering intelligence products directly to the tactical commander in real time. For the United States Navy (USN) RQ-21A provides persistent RSTA support for tactical maneuver decisions and unit-level force defense/force protection for Navy Ships, Marine Corps land forces, Navy Expeditionary Combat Command forces, and Navy Special Warfare Units. This is a combined development program between Navy and Marine Corps. This submission is the Marine Corps portion of the program and has been coordinated with the Navy budget submission under PE 0305234N RQ-21A BLACKJACK.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	8.899	10.914	10.914	-	10.914
Current President's Budget	10.500	6.000	10.914	-	10.914
Total Adjustments	1.601	-4.914	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-4.914			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.089	0.000			
• SBIR/STTR Transfer	-0.060	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Congressional Add Adjustments	1.750	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *Spectral and Reconnaissance Imagery for Tactical Exploitation*	1.690	0.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305239M *I (U)RQ-21A*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Congressional Add Subtotals for Project: 9999	1.690	0.000
Congressional Add Totals for all Projects	1.690	0.000

Change Summary Explanation

FY 2020 funding increase test and evaluation and product development due to investigations, studies, and prototype efforts for the VTOL capability for the RQ-21A platform.

Project 2298:
Note 1: FOT&E period updated with additional details.
Note 2: Capability Upgrade Development added to the schedule.

Project 3192:
Note 1: FOT&E periods updated with additional details and events added in FY 2023 and FY 2024.
Note 2: Production Milestones added to the schedule.
Note 3: Capability Upgrade Development added to the schedule.

Project 9999 - Congressional Add
Note 1: C415 - Spectral and Reconnaissance Imagery for Tactical Exploitation schedule and cost details added.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305239M / *(U)RQ-21A*	Project (Number/Name) 2298 / *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2298: *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*	80.659	8.810	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	89.469
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

In FY19, this effort moved to PE 0305239M PU 3192 (RQ-21 Blackjack).

A. Mission Description and Budget Item Justification

The RQ-21A program provides persistent maritime and land-based tactical Reconnaissance, Surveillance and Target Acquisition (RSTA) data collection and dissemination capability to the Warfighter. For the United States Marine Corps (USMC), RQ-21A provides the Marine Expeditionary Force and subordinate commands (divisions and regiments) with a dedicated, organic Intelligence, Surveillance, and Reconnaissance (ISR) capability delivering intelligence products directly to the tactical commander in real time. For the United States Navy (USN) RQ-21A provides persistent RSTA support for tactical maneuver decisions and unit-level force defense/force protection for Navy Ships, Marine Corps land forces, Navy Expeditionary Combat Command forces, and Navy Special Warfare Units. This is a combined development program between Navy and Marine Corps. This submission is the Marine Corps portion of the program and has been coordinated with the Navy budget submission PE 0305234N RQ-21A BLACKJACK.

The RQ-21A system will continue to evolve addressing capability shortfalls, new requirements, obsolescence equipment, reliability, maintainability, and safety issues. Additional capabilities and/or system upgrades may include Navy Command and Control integration, Weapons Integration, Heavy Fuel Engine, Short Wave Infrared, Laser Designator, Frequency Agile Communications Relay, Digital Common Data link, new launch and recovery methods, parts durability, reparability, and manufacturability, and cyclic refresh of the Electro-optical/Infrared (EO/IR) camera.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	7.674	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 2298 / *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A					
Title: Support	0.629	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: Test and Evaluation	0.507	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	8.810	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTEN/0305234N: *(U)SMALL (LEVEL 0) TACTICAL UAS (STUASL0)*	4.827	5.265	11.545	-	11.545	8.895	6.126	6.083	6.203	Continuing	Continuing
• PMC/4737: *RQ-21 UAS*	82.641	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	397.038
• PMC/7000: *Spares and Repair Parts*	11.027	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	37.400
• APN/0444: *STUASLO*	9.980	46.931	43.819	7.921	51.740	33.939	31.350	30.421	29.107	0.000	426.922

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 2298 / *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

The program office utilized a competitive acquisition approach to award the Engineering and Manufacturing Development effort to field a capability that meets threshold requirements. The Low Rate Initial Production (LRIP) test article was utilized to successfully complete Initial Operational Test and Evaluation. LRIP production continues through FY16 to demonstrate production line maturity. Marine Corps Initial Operational Capability was achieved in 2Q FY16 with entry into full rate production decision occurring in 4Q FY16. Future payload upgrades and development shall be competitively sourced or procured via Government Laboratories with Insitu, the prime contractor, performing integration efforts as required.

E. Performance Metrics

Attainment of Full Rate Production (FRP), correction of Deficiencies from the Initial Operation Test & Evaluation (IOT&E) Report, and attainment of USMC Initial Operational Capability (IOC) and Full Operational Capability (FOC) in accordance with the approved schedule.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305239M / *(U)RQ-21A*	Project (Number/Name) 2298 / *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development/ Upgrades	C/BOA	Insitu, Inc : Bingen, WA	20.930	7.674	Feb 2018	0.000		0.000		-		0.000	0.000	28.604	28.693
Product Development/ Upgrades	WR	NAWCAD : Patuxent River, MD	0.765	0.000		0.000		0.000		-		0.000	0.000	0.765	-
Prior Years Cumulative Total	Various	Various : Various	29.062	0.000		0.000		0.000		-		0.000	0.000	29.062	-
		Subtotal	50.757	7.674		0.000		0.000		-		0.000	0.000	58.431	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Support	WR	NAWCAD : Patuxent River, MD	3.248	0.629	Dec 2017	0.000		0.000		-		0.000	0.000	3.877	-
		Subtotal	3.248	0.629		0.000		0.000		-		0.000	0.000	3.877	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Test and Evaluation	WR	NAWCAD : Patuxent River, MD	1.311	0.507	Dec 2017	0.000		0.000		-		0.000	0.000	1.818	-
Contractor Test System Support	C/FFP	Insitu, Inc : Bingen, WA	1.788	0.000		0.000		0.000		-		0.000	0.000	1.788	1.788
		Subtotal	3.099	0.507		0.000		0.000		-		0.000	0.000	3.606	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Years Cumulative	Various	Various : Various	23.555	0.000		0.000		0.000		-		0.000	0.000	23.555	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 2298 / *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	23.555	0.000		0.000		0.000		-		0.000	0.000	23.555	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	80.659	8.810		0.000		0.000		-		0.000	0.000	89.469	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 2298 / *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*

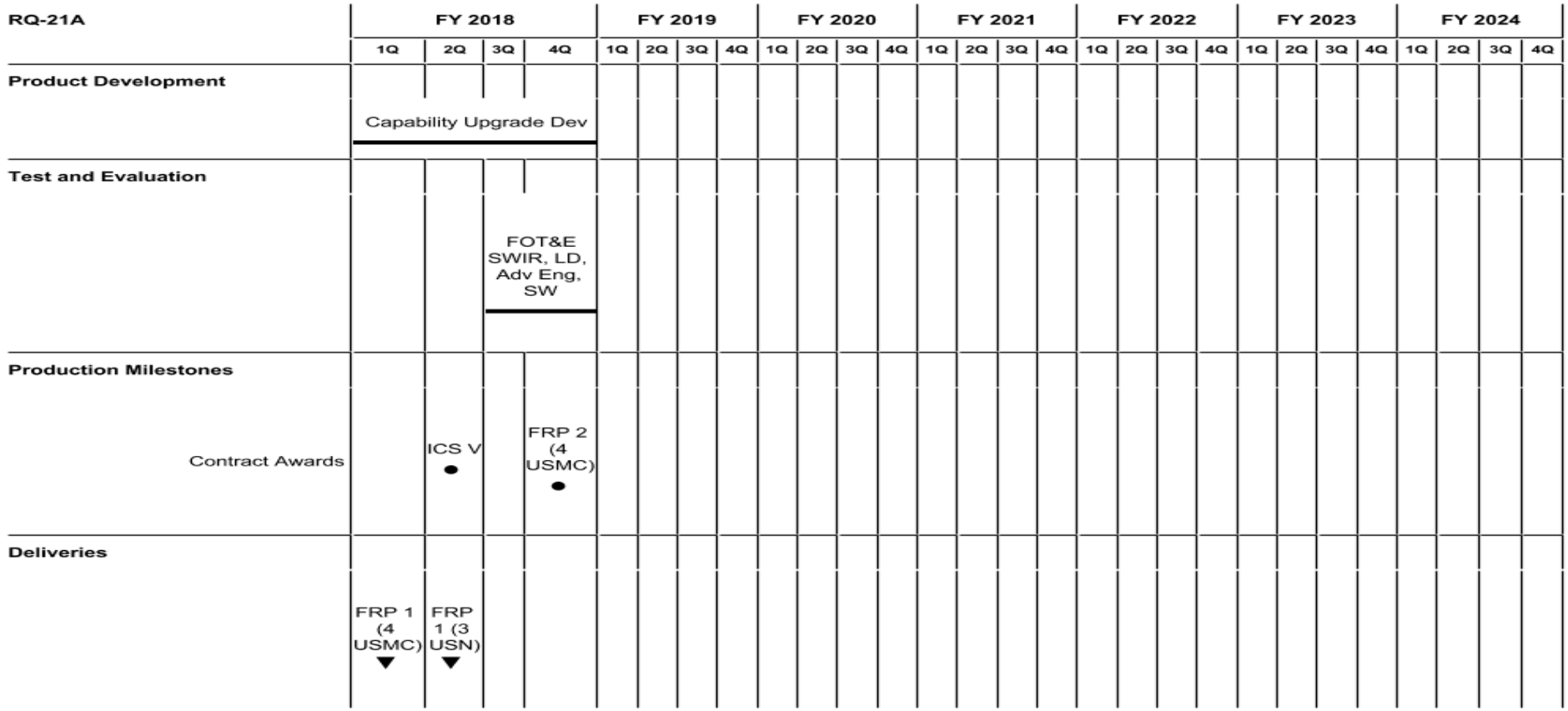

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 2298 / *SMALL (LEVEL 0) TACTICAL UAS (STUAL0)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
RQ-21A				
Product Development: Capability Upgrade Development	1	2018	4	2018
Test and Evaluation: Follow-On Test and Evaluation - SWIR, LD, Adv Engine, Software upgrades	3	2018	4	2018
Production Milestones: Contract Awards: Full-Rate Production Contract Award 2	4	2018	4	2018
Production Milestones: Contract Awards: ICS Contract Award 5	2	2018	2	2018
Deliveries: FRP Lot 1 (4 USMC)	1	2018	1	2018
Deliveries: FRP Lot 1 (3 USN)	2	2018	2	2018

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305239M / *(U)RQ-21A*	Project (Number/Name) 3192 / *RQ-21 BLACKJACK*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3192: *RQ-21 BLACKJACK*	0.000	0.000	6.000	10.914	-	10.914	10.908	11.303	10.527	10.737	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Prior to FY 2019, this effort was funded under PU 2298: SMALL (LEVEL 0) TACTICAL UAS (STUAL0).

A. Mission Description and Budget Item Justification

The RQ-21A program provides persistent maritime and land-based tactical Reconnaissance, Surveillance and Target Acquisition (RSTA) data collection and dissemination capability to the Warfighter. For the United States Marine Corps (USMC), RQ-21A provides the Marine Expeditionary Force and subordinate commands (divisions and regiments) with a dedicated, organic Intelligence, Surveillance, and Reconnaissance (ISR) capability delivering intelligence products directly to the tactical commander in real time. For the United States Navy (USN), RQ-21A provides persistent RSTA support for tactical maneuver decisions and unit-level force defense/force protection for Navy Ships, Marine Corps land forces, Navy Expeditionary Combat Command forces, and Navy Special Warfare Units. This is a combined development program between Navy and Marine Corps. This submission is the Marine Corps portion of the program and has been coordinated with the Navy budget submission PE 0305234N RQ-21A BLACKJACK.

The RQ-21A system will continue to evolve addressing capability shortfalls, new requirements, obsolescence equipment, reliability, maintainability, and safety issues. Additional capabilities and/or system upgrades may include Navy Command and Control integration, Weapons Integration, Heavy Fuel Engine, Short Wave Infrared, Laser Designator, Frequency Agile Communications Relay, Digital Common Data link, and cyclic refresh of the Electro-optical/Infrared (EO/IR) camera.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	0.000	4.597	8.012	0.000	8.012
Articles:	-	-	-	-	-
FY 2019 Plans: RQ-21A Blackjack Corrective Action Program will continue the correction of deficiencies from the Initial Operation Test & Evaluation (IOT&E) Report. The program will continue software engineering and development for block software updates. The program will continue to assess improvements to the fuel tank, maximum gross takeoff weight, launch and recovery systems, parts durability and manufacturability, avionics module, and other components. Initiate assessment of block upgrade plan for the RQ-21A system.					
FY 2020 Base Plans: The program will perform investigations, studies, and prototype efforts for a Vertical Takeoff and Landing (VTOL) capability for RQ-21A platform. The program will improve the ability of the RQ-21A air vehicle to recover in a GPS denied environment and continue upgrades to reduce recovery damage, increase Propulsion Module					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Unit performance and reliability, and improved turret optics. The program will perform software development to correct deficiencies from test as well as enable additional capabilities such as VTOL and enable a block upgrade of multiple system components at a time. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding increase is due to investigations, studies, and prototype efforts for the VTOL capability for the RQ-21A platform.					
Title: Support	0.000	0.778	0.752	0.000	0.752
Articles:	-	-	-	-	-
FY 2019 Plans: Continue Government Engineering Technical Support, other Government Support, Contract Support Services, Program Management Support, and program related travel in support of correction of deficiencies and upgrade efforts. ***FY 2020 Base Plans:*** Continue Government Engineering Technical Support, other Government Support, Contract Support Services, Program Management Support, and program related travel in support of correction of deficiencies and upgrade efforts. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request was decreased by $.026 million due to a reduction of support required for correction of deficiencies and upgrade efforts.					
Title: Test and Evaluation	0.000	0.625	2.150	0.000	2.150
Articles:	-	-	-	-	-
FY 2019 Plans: Initiate follow-on test and evaluation for Propulsion Module Unit Initiate follow-on test and evaluation for SAR/GMTI payload Initiate follow-on test and evaluation for Laser Designator					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Initiate follow-on cyber security test and evaluation ***FY 2020 Base Plans:*** Continue follow-on cybersecurity test and evaluation Initiate follow on test and evaluation to evaluate reliability improvements Continue follow-on test and evaluation for Propulsion Module Unit upgrades and reliability improvements Conduct follow-on test and evaluation on special intel payloads ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding increase in Test and Evaluation is due to the addition of more complex reliability improvements test and evaluation efforts.					
Accomplishments/Planned Programs Subtotals	0.000	6.000	10.914	0.000	10.914

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0444: *STUASLO*	9.980	46.931	43.819	7.921	51.740	33.939	31.350	30.421	29.107	0.000	426.922
• RDTE/0305234N: *(U)Small (Level 0) Tactical UAS (STUASL0)*	4.827	5.265	11.545	-	11.545	8.895	6.126	6.083	6.203	Continuing	Continuing

Remarks

D. Acquisition Strategy

The program office utilized a competitive acquisition approach to award the Engineering and Manufacturing Development effort to field a capability that meets threshold requirements. Full rate production decision was successfully achieved in 4Q FY 2016. Attrition Air Vehicles procurement from FY 2019 on will be done via sole source contracts with Insitu, the prime contractor. Future payload upgrades and development shall be competitively sourced or procured via Government Laboratories with Insitu performing integration efforts as required.

E. Performance Metrics

Attainment of Full Rate Production (FRP), correction of Deficiencies from the IOT&E Report, and attainment of USMC Initial Operational Capability (IOC) and Full Operational Capability (FOC) in accordance with the approved schedule.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305239M / *(U)RQ-21A*	Project (Number/Name) 3192 / *RQ-21 BLACKJACK*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Upgrade Efforts/Correction of Deficiencies	C/BOA	Insitu, Inc : Bingen, WA	0.000	0.000		4.597	Jul 2019	5.000	Apr 2020	-		5.000	Continuing	Continuing	Continuing
Alternative recovery and landing	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.000		3.012	Apr 2020	-		3.012	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		4.597		8.012		-		8.012	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Support	WR	NAWC-AD : Patuxent River, MD	0.000	0.000		0.556	Dec 2018	0.752	Dec 2019	-		0.752	Continuing	Continuing	Continuing
Software Engineering Support	WR	NAWC-WD : China Lake, Ca	0.000	0.000		0.222	Dec 2018	0.000		-		0.000	0.000	0.222	-
		Subtotal	0.000	0.000		0.778		0.752		-		0.752	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test & Evaluation	TBD	OPTEVFOR : Norfolk, VA	0.000	0.000		0.226	Jul 2019	0.400	Jul 2020	-		0.400	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	OPTEVFOR : Norfolk, VA	0.000	0.000		0.399	Dec 2018	0.000		-		0.000	0.000	0.399	-
Development Test & Evaluation	WR	NAWC_AD : Patuxent River, MD	0.000	0.000		0.000		1.200	Jul 2020	-		1.200	Continuing	Continuing	Continuing
Operational Test & Evaluation	C/BA	VMX-1 : Yuma, AZ	0.000	0.000		0.000		0.550	Jul 2020	-		0.550	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.625		2.150		-		2.150	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305239M / *(U)RQ-21A*	Project (Number/Name) 3192 / *RQ-21 BLACKJACK*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		6.000		10.914		-		10.914	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*

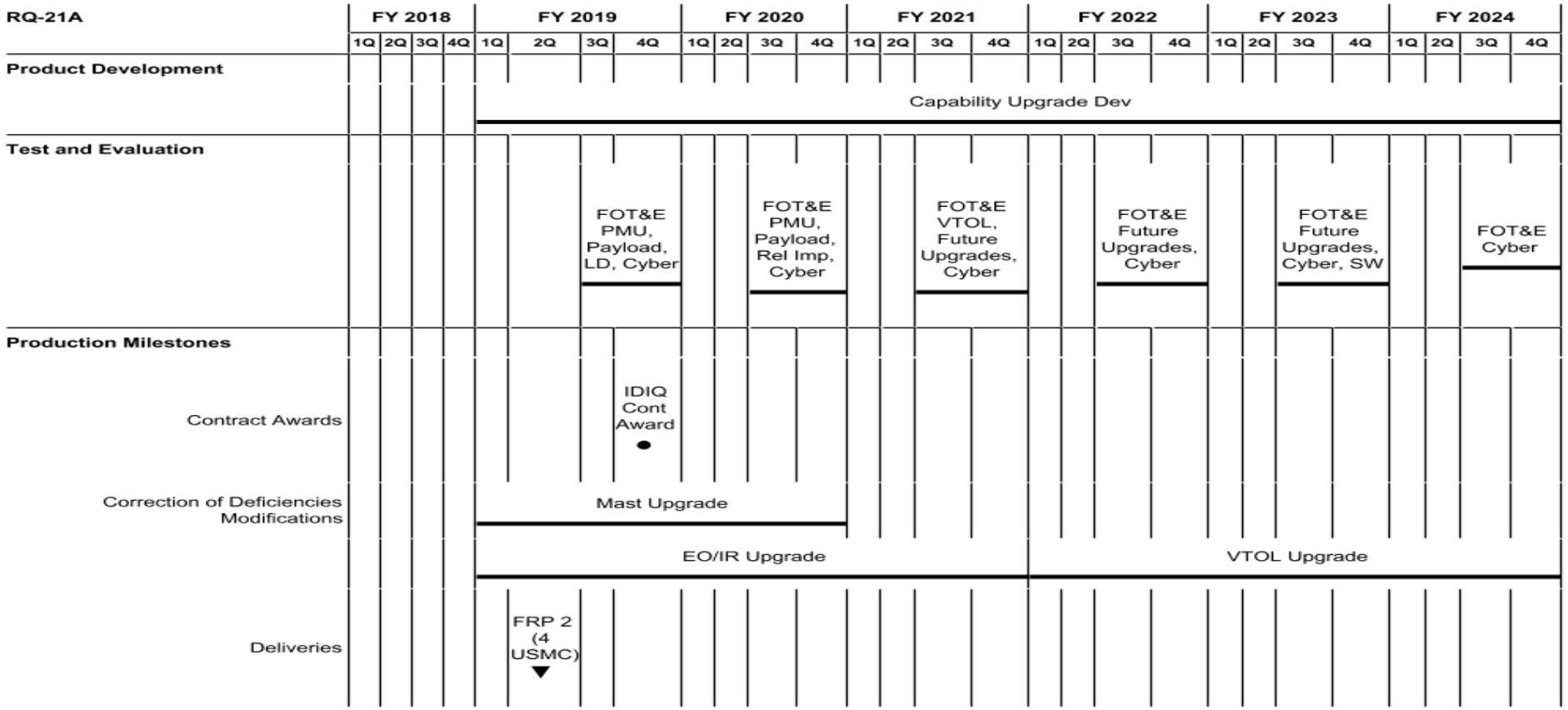

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 3192 / *RQ-21 BLACKJACK*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
RQ-21A				
Product Development: Capability Upgrade Development	1	2019	4	2024
Test and Evaluation: Follow-On Test and Evaluation - Propulsion Module Unit, Payload, LD, Cybersecurity	3	2019	4	2019
Test and Evaluation: Follow-On Test and Evaluation - Propulsion Module Unit, Payload, Reliability Improvements, Cybersecurity	3	2020	4	2020
Test and Evaluation: Follow-On Test and Evaluation -- VTOL, Future Upgrades, Cybersecurity	3	2021	4	2021
Test and Evaluation: Follow-On Test and Evaluation - Future Upgrades, Cybersecurity	3	2022	4	2022
Test and Evaluation: Follow-On Test and Evaluation - Future Upgrades, Cybersecurity, Software Upgrades	3	2023	4	2023
Test and Evaluation: Follow-On Test and Evaluation - Cybersecurity	3	2024	4	2024
Production Milestones: Contract Awards: IDIQ Contract Award	4	2019	4	2019
Production Milestones: Correction of Deficiencies Modifications: Mast Upgrade	1	2019	4	2020
Production Milestones: Correction of Deficiencies Modifications: EO/IR Upgrade	1	2019	4	2021
Production Milestones: Correction of Deficiencies Modifications: VTOL Upgrade	1	2022	4	2024
Production Milestones: Deliveries: FRP Lot 2 USMC	2	2019	2	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305239M / *(U)RQ-21A*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	1.690	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.690
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Office of Naval Research Future Naval Capability (FNC) program, Spectral and Reconnaissance Imagery for Tactical Exploitation (SPRITE), is a science and technology research development project to achieve a multi-sensor payload for Group 3 Small Tactical UAS that incorporates a daytime wide area motion imagery (WAMI) sensor, a Hyper-, Mulit-spectral sensor and a high resolution, narrow field of view (FOV) inspection sensor. The SPRITE FNC research effort maintains an active Technology Transition Agreement (TTA) that is scoped to result in a demonstration event on a target or surrogate Group 3 TUAS in FY20. Pending successful achievement of the development performance criteria, subsequent maturing of the prototype is needed to achieve integration and transition to a Program of Record (POR). The USMC has a standing urgent needs based requirement for a SPRITE capability to provide the Marine Air-Ground Task Force (MAGTF) a flexible, real-time Intelligence, Surveillance, and Reconnaissance (ISR)/situational awareness asset that supports Find/Fix/Finish/Exploit/Analyze (F3EA), Counter-Weapons of Mass Destruction, operational over watch, pattern of life analysis, target development, mapping, event reconstruction efforts and force protection missions over city-sized areas. Recognizing that subsets of these advanced EO capabilities are currently mature enough for integration and testing on the USMC RQ-21A Blackjack unmanned aircraft before the complete SPRITE capability is available, the congressional add will contribute to the cost required to mature these spinout subsystems into a Wide Area Surveillance payload functional for user evaluation and testing on the RQ-21A within the Unmanned Aerial Systems Payloads program. It is anticipated that this will effectively accelerate this capability transition by 3-5 years, contributing significantly towards the systems engineering, and light weighting redesign of a proof-of-concept prototype.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Spectral and Reconnaissance Imagery for Tactical Exploitation	1.690	0.000
FY 2018 Accomplishments: N/A		
FY 2019 Plans: N/A		
Congressional Adds Subtotals	1.690	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The UAS Payload program utilizes a hybrid acquisition model. Development is a mixture of evolutionary and single step to full capability processes, but typically follows an incremental or spiral approach. The UAS payloads portfolio consists of a family of mission kits and spans a broad spectrum of capability areas. Capabilities are transitioned from variously sourced, high (5-7) Technology Readiness Level (TRL) science and technology (S&T) projects to the UAS Payloads portfolio for completion

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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of research, development, test, and evaluation (RDTE) of the capability, systems engineering development into mission kits, and entrance into the Engineering Change Proposal (ECP) process for integration into Small Tactical Unmanned Aircraft Systems (STUAS). Mission kits field capabilities that meet threshold or objective requirements, and facilitate the six functions of Marine Corps Aviation and the Marine Corps Intelligence Surveillance, and Reconnaissance Enterprise across the range of military operations.

E. Performance Metrics

Validation of funding, derived requirements, project risks, cost and schedule estimates, contracting strategy, achievement of a technology readiness level of TRL 7 or higher for Program of Record (PoR) transition and attainment of USMC Initial Operational Capability (IOC) in accordance with the approved schedule.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SPRITE Development	C/CPFF	TBD : Lakehurst, NJ	0.000	1.690	Aug 2018	0.000		0.000		-		0.000	0.000	1.690	1.690
		Subtotal	0.000	1.690		0.000		0.000		-		0.000	0.000	1.690	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	1.690		0.000		0.000		-		0.000	0.000	1.690	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 9999 / *Congressional Adds*

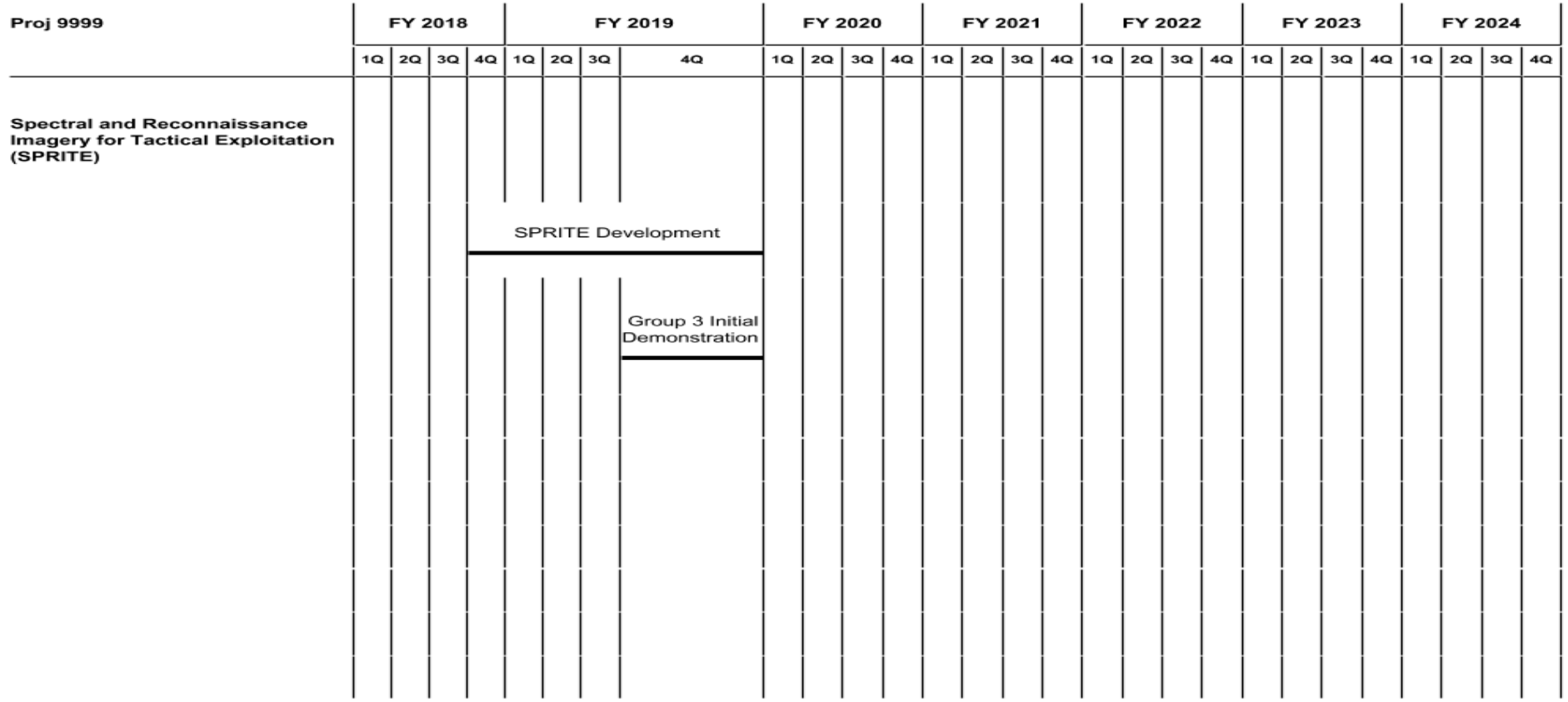

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305239M / *(U)RQ-21A*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Spectral and Reconnaissance Imagery for Tactical Exploitation (SPRITE): SPRITE Development	4	2018	4	2019
Spectral and Reconnaissance Imagery for Tactical Exploitation (SPRITE): SPRITE Group 3 Initial Demonstration	4	2019	4	2019

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305242M *I (U)Unmanned Aerial Systems (UAS) Payloads*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	20.427	18.392	5.956	3.704	-	3.704	6.044	5.869	5.415	5.524	Continuing	Continuing
2052: *RQ-21 Payload Development*	0.000	0.000	5.956	3.704	-	3.704	6.044	5.869	5.415	5.524	Continuing	Continuing
5501: *Signals Intelligence (SIGINT)*	9.626	5.562	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.188
5502: *Synthetic Aperture Radar/ Motion Target Indicator (SAR/ MTI)*	10.801	5.801	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.602
5504: *Wide Area Persistent Surveillance (TNWAS)*	0.000	7.029	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.029

A. Mission Description and Budget Item Justification

The Unmanned Aerial System (UAS) Payload Program will provide an agile and responsive means to integrate and support the development and fielding of Intelligence, Surveillance, and Reconnaissance (ISR) and non-ISR payloads as well as data Processing, Exploitation, and Dissemination (PED) and Communication capabilities for all UAS's within the Marine Corps. These component, sensor, and PED capabilities will alleviate Marine Corps ISR mission needs and gaps caused by rapidly changing missions, environments, threats, and technologies as well as enhance the effectiveness and operational utility of the UAS.

The UAS Payload program element will increase the effectiveness and versatility of the Marine Corps UAS currently planned to have Electro-Optic(EO) / Infrared (IR) collection, communications relay, and automatic identification capabilities. Additional payload capabilities include Communication, Automation, Signals Intelligence Collection (SIGINT), Electronic Warfare Support (ES), Radar Imagery, Moving Target Indicator (MTI) Imagery, Wide Area and Hyperspectral Imagery collection, Artificial Intelligence (AI), Combined Multiple Intelligence (MULTI-INT), Light Detection and Ranging (LiDAR), Weapons Integration, and related PED. These advanced capabilities and payloads provide the Marine Expeditionary Force and subordinate commands (divisions and regiments) with dedicated, organic capabilities that facilitate the six functions of Marine Corps Aviation and the Marine Corps ISR Enterprise across the range of military operations.

Note: In FY19, PE 0305242M/PU 5501,5502, and 5504 were consolidated to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305242M *I (U)Unmanned Aerial Systems (UAS) Payloads*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	18.578	5.956	5.955	-	5.955
Current President's Budget	18.392	5.956	3.704	-	3.704
Total Adjustments	-0.186	0.000	-2.251	-	-2.251
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.186	0.000			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-2.252	-	-2.252
• Rate/Misc Adjustments	0.000	0.000	0.001	-	0.001

Change Summary Explanation

The FY 2020 funding request was reduced by $1.400 million to account for the availability of prior year execution balances.

FY 2020 program decrease in Multiple Intelligence (Multi-INT) product development efforts.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
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COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2052: *RQ-21 Payload Development*	0.000	0.000	5.956	3.704	-	3.704	6.044	5.869	5.415	5.524	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Unmanned Aerial System (UAS) Payload Program will provide an agile and responsive means to integrate and support the development and fielding of Intelligence, Surveillance, and Reconnaissance (ISR) and non-ISR payloads as well as data Processing, Exploitation, and Dissemination (PED) and Communication capabilities for all UAS's within the Marine Corps. These component, sensor, and PED capabilities will alleviate Marine Corps ISR mission needs and gaps caused by rapidly changing missions, environments, threats, and technologies as well as enhance the effectiveness and operational utility of the UAS.

The UAS Payload program element will increase the effectiveness and versatility of the Marine Corps UAS currently planned to have Electro-Optic(EO) / Infrared (IR) collection, communications relay, and automatic identification capabilities. Additional payload capabilities include Communication, Automation, Signals Intelligence Collection (SIGINT), Electronic Warfare Support (ES), Radar Imagery, Moving Target Indicator (MTI) Imagery, Wide Area and Hyperspectral Imagery collection, Artificial Intelligence (AI), Combined Multiple Intelligence (MULTI-INT), Light Detection and Ranging (LiDAR), Weapons Integration, and related PED. These advanced capabilities and payloads provide the Marine Expeditionary Force and subordinate commands (divisions and regiments) with dedicated, organic capabilities that facilitate the six functions of Marine Corps Aviation and the Marine Corps ISR Enterprise across the range of military operations.

SIGINT payloads will fill current capability gaps for the USMC ISR mission and are required as part of the USMC to locate, target, and exploit adversary Signals of Interest (SOI). The SIGINT payload capability leverages technologies previously developed and deployed by other Services and/or DoD laboratories to reduce cost and minimize schedule and will be able to cue other ISR sensors to specific target geolocations. This technology can effectively be adapted and applied to support Counter UAS (CUAS)

Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI) payload will fill current capability gaps for the USMC ISR mission and will allow USMC small tactical ISR assets to locate and track ground targets that cannot effectively be located or tracked with the current ground based or EO/IR airborne sensor technology under a wider range of atmospheric conditions and greater stand-off ranges. The SAR/MTI payload capability possesses a size, weight, and power form factor suitable for small tactical UAS leverages technologies previously developed and deployed by other Services and/or DoD laboratories to reduce cost and minimize schedule and will be able to cue other ISR sensors to specific target geolocations. This technology can effectively be adapted and applied to overland and maritime environments and can also support CUAS.

Wide Area Persistent Surveillance (WAS) payload will fill current capability gaps of USMC ISR mission and will allow USMC small tactical ISR assets the capability to improve battlefield awareness and the capability to assure access and hold at risk, as well as to enable power projection in environments that are not currently accessible by imaging over wide areas at very high resolution at substantial stand-off distances with full motion video access for up to five discrete boxes within the

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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total field of view selected by disadvantaged ground users. The current payload in development leverages technologies previously developed and deployed by other Services and/or DoD laboratories to reduce cost and minimize schedule and will be able to cue other ISR sensors to specific target geolocations.

Multiple Intelligence (Multi-INT) payload provides the integration of sensors operating in widely disparate modalities such as Communications Relay, SIGINT/ES, RADAR, and EO/IR, enabling the collection of synchronized data that maximizes the effective employment envelope by collectively decreasing uncertainties, such as geolocation accuracy, and simultaneously prosecuting multiple targets of interest and maximizing datalink capability. All sensors have performance limitations, critically in range, sensitivity, and resolution. The use of multiple single source sensors, or Multi-INT capability, overcomes the individual sensor limitations by increasing the collective performance, providing overlapping coverage, increased overall system reliability, and extension of capability, thereby yielding greater actionable intelligence. It will enable an increase in the confidence of target detection, a decrease in the time to arrive at positive identification of the target of interest, and the ability to utilize automation for sensor integration and control such as cross-cue and mission specific target identification. The USMC Marine Air-Ground Task Force (MAGTF) will be enabled to operate with an airborne ability to exploit asymmetric threats and prosecute targets and tactics across a varied range of environments and temporal periods.

Light Detection and Ranging (LiDAR) is the active electro optic illumination of an area with pulsed laser light and measurement of the reflected pulses with a sensor. LiDAR is a synoptic measurement, meaning that data is collected rapidly enough over a given area to eliminate any time related variations. The differences in laser return times and wavelengths can be used to make accurate, three dimensional representation of the targets, survey areas, or penetrable volumes. LiDAR will fill current capability gaps in permissive and non-permissive collection environments to provide high-resolution imaging and surveying of specific targets, earth and urban area topography and digital elevations, as well as near-shore bathymetry for use in warfighting and emergency response operations. LiDAR data can be critically useful in modeling and algorithmic applications, such as image classification and identification for automated Artificial Intelligence (AI) processing.

Artificial Intelligence (AI) and Automated Processing supports the rapid detection, tracking, and characterization in all ISR data types and provides actionable information for fusion and tracking exploitation systems and processes.

Processing, Exploitation, and Dissemination (PED) technologies enable minimization of the physical footprint of the UAS system with enhanced mission capabilities and the sharing and merging of data across multiple domains.

Note: In FY19, PE 0305242M/PU 5501,5502, and 5504 were consolidated to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	0.000	4.512	2.588	0.000	2.588
Articles:	-	-	-	-	-
FY 2019 Plans: -Complete development of WAS payload hardware and prototype. -Initiate development of a MULTI-INT SIGINT payload system.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Initiate Government Engineering Technical Support, other Government Support, Contract Support Services, Program Management Support, and program related travel in support of the MULTI-INT SIGINT payload system. -Initiate SIGINT product upgrades. -Initiate SAR/MTI product upgrades. ***FY 2020 Base Plans:*** -Continue SIGINT product upgrades. -Continue SAR/MTI product upgrades. -Complete development of a MULTI-INT SIGINT payload system prototype. -Initiate integration efforts for MULTI-INT payload system. -Initiate WAS payload integration. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request was decreased by $1.924 million due to reduced MULTI-INT product development efforts.					
Title: Support	0.000	0.846	0.600	0.000	0.600
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue Government Engineering Technical Support, other Government Support, Contract Support Services, Program Management Support, and program related travel in support of payload systems. -Continue Integrated Logistics Support (ILS), training concept development and data management/ documentation. ***FY 2020 Base Plans:*** -Continue Government Engineering Technical Support, other Government Support, Contract Support Services, Program Management Support, and program related travel in support of the payload systems. -Continue Integrated Logistics Support (ILS), training concept development and data management/ documentation. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request was decreased by $0.246 million due to completion of the ILS effort for SIGINT.					
Title: Management Services	0.000	0.295	0.016	0.000	0.016
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue development of MULTI-INT and WAS payload system architecture. -Initiate/Complete documenting Field User Evaluation (FUE) reports. ***FY 2020 Base Plans:*** -Complete development of a Tactical EO/IR SIGINT Integrated for Targeting (TEISIT) payload system. -Complete development of MULTI-INT and WAS payload system architecture. -Initiate travel in support of various payload development, integration and test efforts. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request decreased due to completion of TEISIT development support.					
Title: Test and Evaluation	0.000	0.303	0.500	0.000	0.500
Articles:	-	-	-	-	-
FY 2019 Plans: -Continue developmental payload testing. ***FY 2020 Base Plans:*** -Continue developmental payload testing. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The FY 2020 funding request was increased by $0.197 million due to increased test events required for MULTI-INT and WAS capabilities.					
Accomplishments/Planned Programs Subtotals	0.000	5.956	3.704	0.000	3.704

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4787: *UAS Payloads*	22.008	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	36.479
• APN/0444: *STUASLO*	9.980	46.931	43.819	7.921	51.740	33.939	31.350	30.421	29.107	0.000	426.922

Remarks

In FY2019, partial funding from BLI 4787 was transferred to BLI 0444 as part of a Blue in Support of Green (BISOG) transition.

D. Acquisition Strategy

The payload development process will follow a Hybrid Acquisition Model of Incremental/Spiral approach while leveraging work conducted by various government laboratories such as the Office of Naval Research (ONR), Defense Advanced Research Projects Agency (DARPA), Air Force Research Lab (AFRL), Joint Improvised Threat Defeat Organization (JIDO) under the Defense Threat Reduction Agency (DTRA), the National Security Agency (NSA), and the National Geospatial Agency (NGA). All payloads will follow similar acquisition paths but on independent time schedules. These acquisition paths will be defined by three (3) phases, each marked by a decision gate. Phase I establishes the preliminary integration design concept and conduct of technology demonstration with validation of a Technology Readiness Level (TRL) 5/6 as the decision gate for Phase II. Phase II establishes full payload-to-Unmanned Aircraft System (UAS) integration during which time all necessary program management, engineering, fabrication, test, and evaluation activities are conducted to achieve Test Article Fabrication, System Test and Evaluation, Integrated Logistics Support (ILS) and Training Concept development, and Data Management and Documentation. Validation of funding, derived requirements, project risks, cost and schedule estimates, contracting strategy and achievement of TRL 7 or higher constitute the decision gate for Phase III. Phase III is program of record transition which supports a production decision based on the exit criteria from Phase II.

E. Performance Metrics

Validation of funding, derived requirements, project risks, cost and schedule estimates, contracting strategy, achievement of a technology readiness level of TRL 7 or higher for Program of Record (PoR) transition, and attainment of USMC Initial Operational Capability (IOC) in accordance with the approved schedule.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	Project (Number/Name) 2052 / *RQ-21 Payload Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	MIPR	Various : Various	0.000	0.000		4.017	Dec 2018	2.088	Apr 2020	-		2.088	Continuing	Continuing	Continuing
Government Engineering	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.495	Dec 2018	0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		4.512		2.588		-		2.588	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	Various	Various : Various	0.000	0.000		0.846	Dec 2018	0.600	Dec 2019	-		0.600	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.846		0.600		-		0.600	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.303	Dec 2018	0.500	Dec 2019	-		0.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.303		0.500		-		0.500	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.244	Feb 2019	0.000		-		0.000	0.000	0.244	-
Travel	Various	Various : Various	0.000	0.000		0.051	Oct 2018	0.016	Dec 2019	-		0.016	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.295		0.016		-		0.016	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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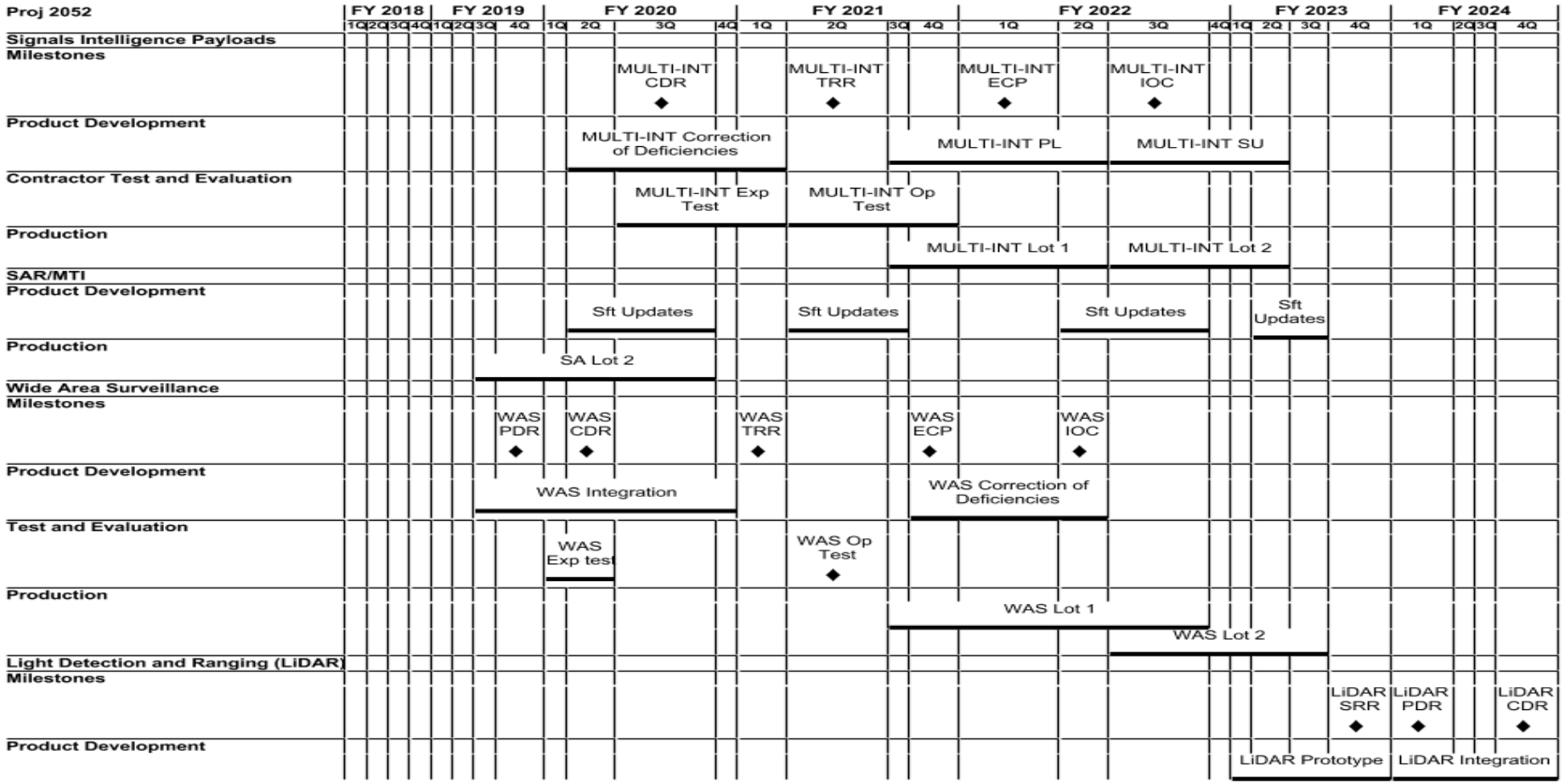
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		5.956		3.704		-		3.704	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 2052 / *RQ-21 Payload Development*



2020PB - 0305242M - 2052

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 2052 / *RQ-21 Payload Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2052				
Milestones: MULTI-INT Phase II Critical Design Review	3	2020	3	2020
Milestones: MULTI-INT Phase II Test Readiness Review	2	2021	2	2021
Milestones: MULTI-INT Phase II Engineering Change Proposal	1	2022	1	2022
Milestones: MULTI-INT Phase II Initial Operational Capability	3	2022	3	2022
Product Development: MULTI-INT Correction of Deficiencies	2	2020	1	2021
Product Development: MULTI-INT Platform Integration	3	2021	2	2022
Product Development: MULTI-INT Software Upgrades	3	2022	2	2023
Contractor Test and Evaluation: MULTI-INT Experimental Test	3	2020	1	2021
Contractor Test and Evaluation: MULTI-INT Operational Test	2	2021	4	2021
Production: MULTI-INT Lot 1	3	2021	2	2022
Production: MULTI-INT Lot 2	3	2022	2	2023
Product Development: SAR/MTI Software Update 1	2	2020	3	2020
Product Development: SAR/MTI Software Update 2	2	2021	3	2021
Product Development: SAR/MTI Software Update 3	2	2022	3	2022
Product Development: SAR/MTI Software Update 4	2	2023	3	2023
Production: SAR/MTI	3	2019	3	2020
Milestones: WAS Preliminary Design Review	4	2019	4	2019
Milestones: WAS Critical Design Review	2	2020	2	2020
Milestones: WAS Test Readiness Review	1	2021	1	2021
Milestones: WAS Engineering Change Proposal	4	2021	4	2021
Milestones: WAS Initial Operational Capability	2	2022	2	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 2052 / *RQ-21 Payload Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Product Development: WAS Integration	3	2019	4	2020
Product Development: WAS Correction of Deficiencies	4	2021	2	2022
Test and Evaluation: WAS Experimental Test	1	2020	2	2020
Test and Evaluation: WAS Operational Test	2	2021	2	2021
Production: WAS Production Lot 1	3	2021	3	2022
Production: WAS Production Lot 2	3	2022	3	2023
Milestones: Light Detection and Ranging (LiDAR) System Requirements Review	4	2023	4	2023
Milestones: Light Detection and Ranging (LiDAR) Preliminary Design Review	1	2024	1	2024
Milestones: Light Detection and Ranging (LiDAR) Critical Design Review	4	2024	4	2024
Product Development: Light Detection and Ranging (LiDAR) Prototype	1	2023	4	2023
Product Development: Light Detection and Ranging (LiDAR) Integration	1	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	Project (Number/Name) 5501 / *Signals Intelligence (SIGINT)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
5501: *Signals Intelligence (SIGINT)*	9.626	5.562	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.188
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	5.139	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: Support	0.328	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: Management Services	0.095	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5501 / *Signals Intelligence (SIGINT)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development). ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	5.562	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4787: *UAS Payloads*	22.008	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	36.479

Remarks

D. Acquisition Strategy

In FY19 this effort transitioned to PE 0305242M PU 2052 and falls in line with respective acquisition strategy.

E. Performance Metrics

In FY19 this effort transitions to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	Project (Number/Name) 5501 / *Signals Intelligence (SIGINT)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	MIPR	AFRL : Dayton, OH	6.655	4.817	Feb 2018	0.000		0.000		-		0.000	0.000	11.472	-
Government Engineering	WR	NAWCAD : Patuxent River, MD	1.790	0.322	Feb 2018	0.000		0.000		-		0.000	0.000	2.112	-
		Subtotal	8.445	5.139		0.000		0.000		-		0.000	0.000	13.584	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	MIPR	NAWCAD : Patuxent River, MD	0.994	0.328	Feb 2018	0.000		0.000		-		0.000	0.000	1.322	-
		Subtotal	0.994	0.328		0.000		0.000		-		0.000	0.000	1.322	N/A

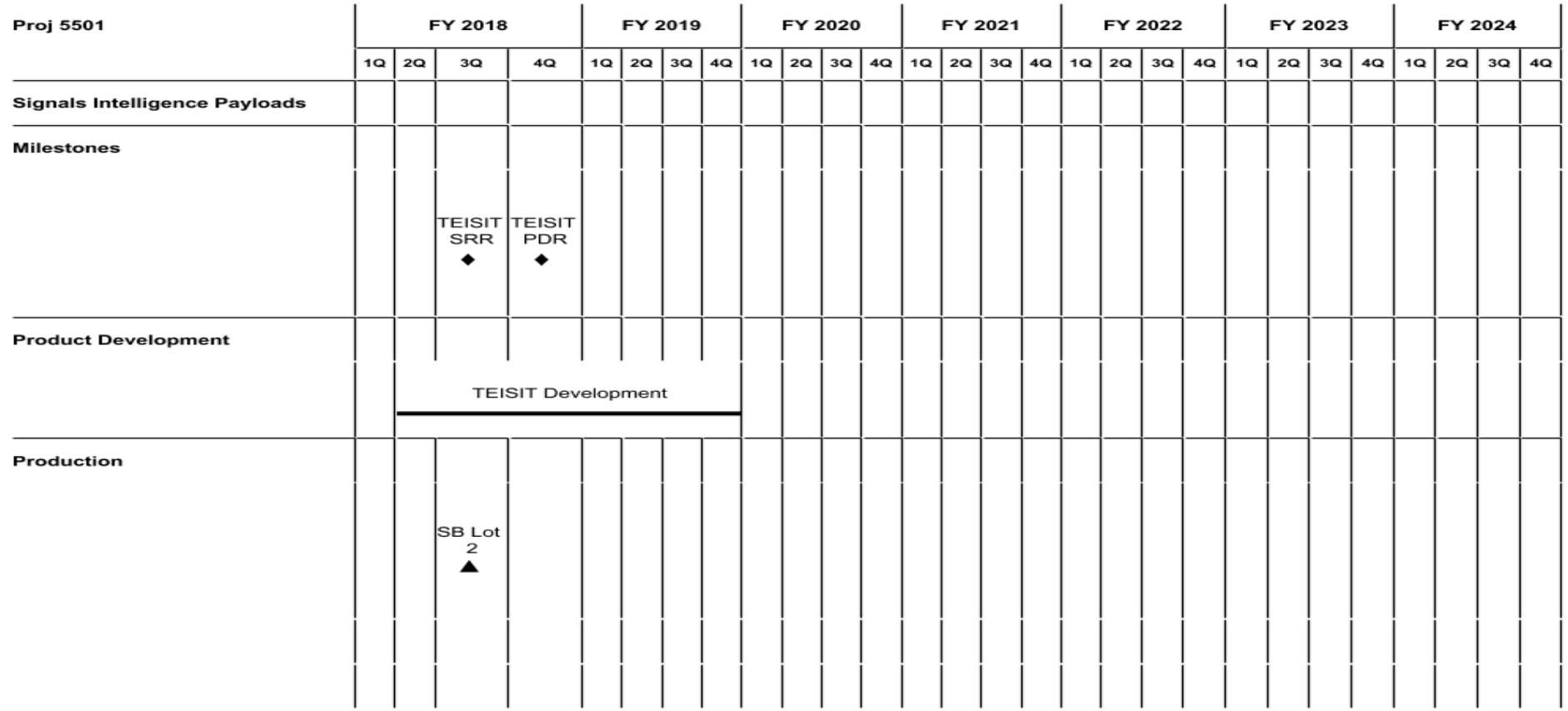
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	MIPR	NAWCAD : Patuxent River, MD	0.129	0.067	Feb 2018	0.000		0.000		-		0.000	0.000	0.196	-
Travel	Various	Various : Various	0.058	0.028	Feb 2018	0.000		0.000		-		0.000	0.000	0.086	-
		Subtotal	0.187	0.095		0.000		0.000		-		0.000	0.000	0.282	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	9.626	5.562		0.000		0.000		-		0.000	0.000	15.188	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5501 / *Signals Intelligence (SIGINT)*



2020PB - 0305242M - 5501

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5501 / *Signals Intelligence (SIGINT)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 5501				
Milestones: TEISIT Systems Requirements Review	3	2018	3	2018
Milestones: TEISIT Preliminary Design Review	4	2018	4	2018
Product Development: TEISIT Payload Development	2	2018	4	2019
Production: Spectral Bat Production Lot 2	3	2018	3	2018

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*				Project (Number/Name) 5502 / *Synthetic Aperture Radar/Motion Target Indicator (SAR/MTI)*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
5502: *Synthetic Aperture Radar/ Motion Target Indicator (SAR/ MTI)*	10.801	5.801	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.602
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	4.813	0.000	0.000	0.000	0.000
Articles:	2	-	-	-	-
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development). ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Support	0.604	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development). ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Management Services	0.087	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5502 / *Synthetic Aperture Radar/Motion Target Indicator (SAR/MTI)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development). ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Title: Test and Evaluation	0.297	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development). ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	5.801	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4787: *UAS Payloads*	22.008	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	36.479

Remarks

D. Acquisition Strategy

In FY19 this effort transitioned to PE 0305242M/PU 2052 and falls in line with respective acquisition strategy.

E. Performance Metrics

In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	Project (Number/Name) 5502 / *Synthetic Aperture Radar/Motion Target Indicator (SAR/MTI)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	MIPR	ACC-Natick : Natick, MA	8.494	4.197	Feb 2018	0.000		0.000		-		0.000	0.000	12.691	-
Government Engineering	WR	NAWCAD : Patuxent River, MD	1.038	0.616	Feb 2018	0.000		0.000		-		0.000	0.000	1.654	-
		Subtotal	9.532	4.813		0.000		0.000		-		0.000	0.000	14.345	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	Various	Various : Various	0.858	0.604	Feb 2018	0.000		0.000		-		0.000	0.000	1.462	-
		Subtotal	0.858	0.604		0.000		0.000		-		0.000	0.000	1.462	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	MIPR	NAWCAD : Patuxent River	0.292	0.297	Feb 2018	0.000		0.000		-		0.000	0.000	0.589	-
		Subtotal	0.292	0.297		0.000		0.000		-		0.000	0.000	0.589	N/A

Management Services ($ in Millions)

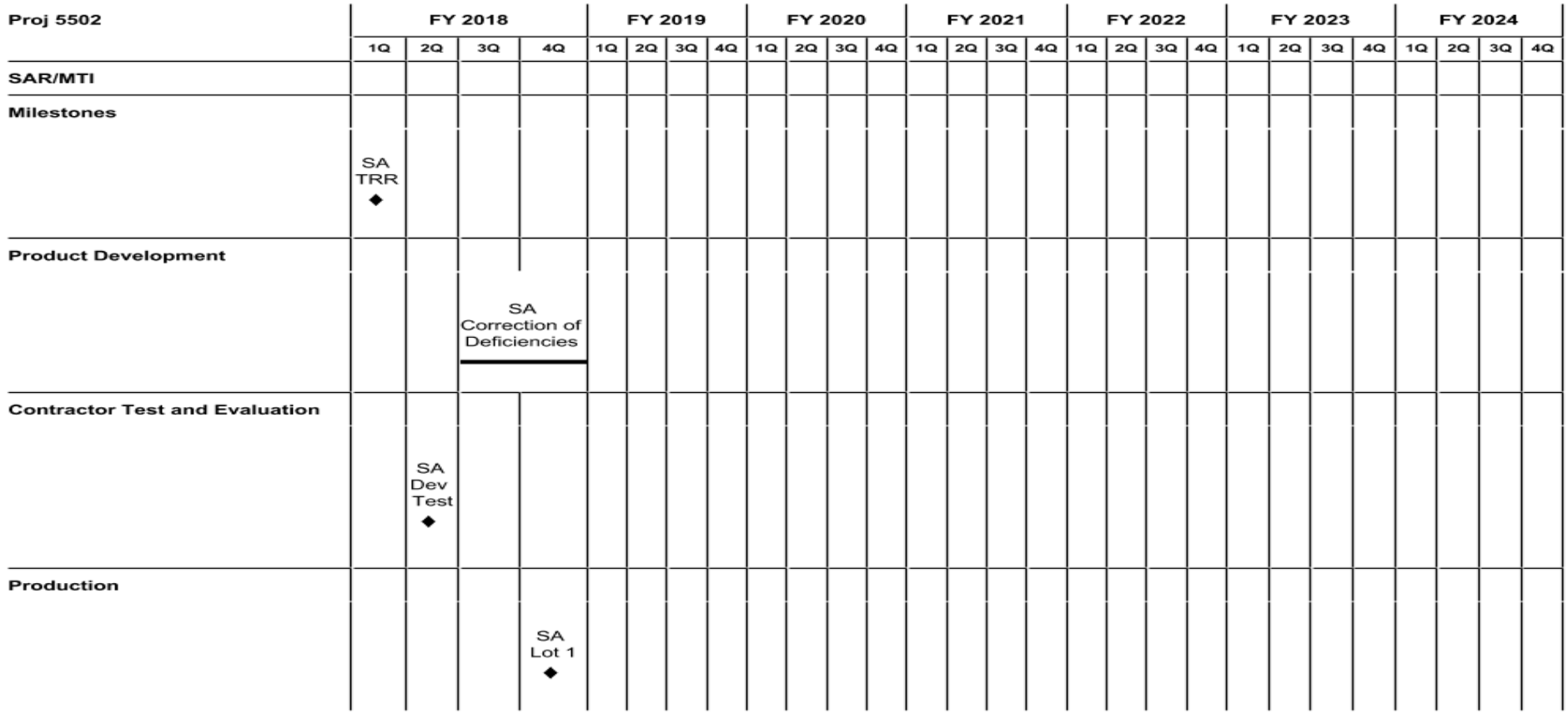
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	0.074	0.074	Feb 2018	0.000		0.000		-		0.000	0.000	0.148	-
Travel	Various	Various : Various	0.045	0.013	Feb 2018	0.000		0.000		-		0.000	0.000	0.058	-
		Subtotal	0.119	0.087		0.000		0.000		-		0.000	0.000	0.206	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	Project (Number/Name) 5502 / *Synthetic Aperture Radar/Motion Target Indicator (SAR/MTI)*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	10.801	5.801		0.000		0.000		-		0.000	0.000	16.602	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5502 / *Synthetic Aperture Radar/Motion Target Indicator (SAR/MTI)*



2020DON - 0305242M - 5502

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5502 / *Synthetic Aperture Radar/Motion Target Indicator (SAR/MTI)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 5502				
Milestones: Split Aces Test Readiness Review	1	2018	1	2018
Product Development: Split Aces Correction of Deficiencies	3	2018	4	2018
Contractor Test and Evaluation: Split Aces Developmental Test	2	2018	2	2018
Production: Split Aces Production Lot 1	4	2018	4	2018

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	Project (Number/Name) 5504 / *Wide Area Persistent Surveillance (TNWAS)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
5504: *Wide Area Persistent Surveillance (TNWAS)*	0.000	7.029	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.029
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	6.634	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: Support	0.146	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Title: Management Services	0.249	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5504 / *Wide Area Persistent Surveillance (TNWAS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development). ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	7.029	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PMC/4787: *UAS Payloads*	22.008	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	36.479

Remarks

$9.750M Project Minotaur

D. Acquisition Strategy

In FY19 this effort transitions to PE 0305242M/PU 2052 and falls in line with respective acquisition strategy.

E. Performance Metrics

In FY19 this effort transitioned to PE 0305242M/PU 2052 (Unmanned Aerial Systems (UAS) Payloads/RQ-21 Payload Development).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	Project (Number/Name) 5504 / *Wide Area Persistent Surveillance (TNWAS)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	C/FFP	L3 : Norfolk, VA	0.000	6.634	Mar 2018	0.000		0.000		-		0.000	0.000	6.634	-
		Subtotal	0.000	6.634		0.000		0.000		-		0.000	0.000	6.634	N/A

Remarks

The 2018 effort for Tactical Nighttime Wide Area Persistent Surveillance (TNWAS) payload development leverages work started by the Office of Naval Research. The contractor performing the work is L3, however the government agency performing contracting activities is TBD.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	C/BA	Various : Various	0.000	0.146	Mar 2018	0.000		0.000		-		0.000	0.000	0.146	-
		Subtotal	0.000	0.146		0.000		0.000		-		0.000	0.000	0.146	N/A

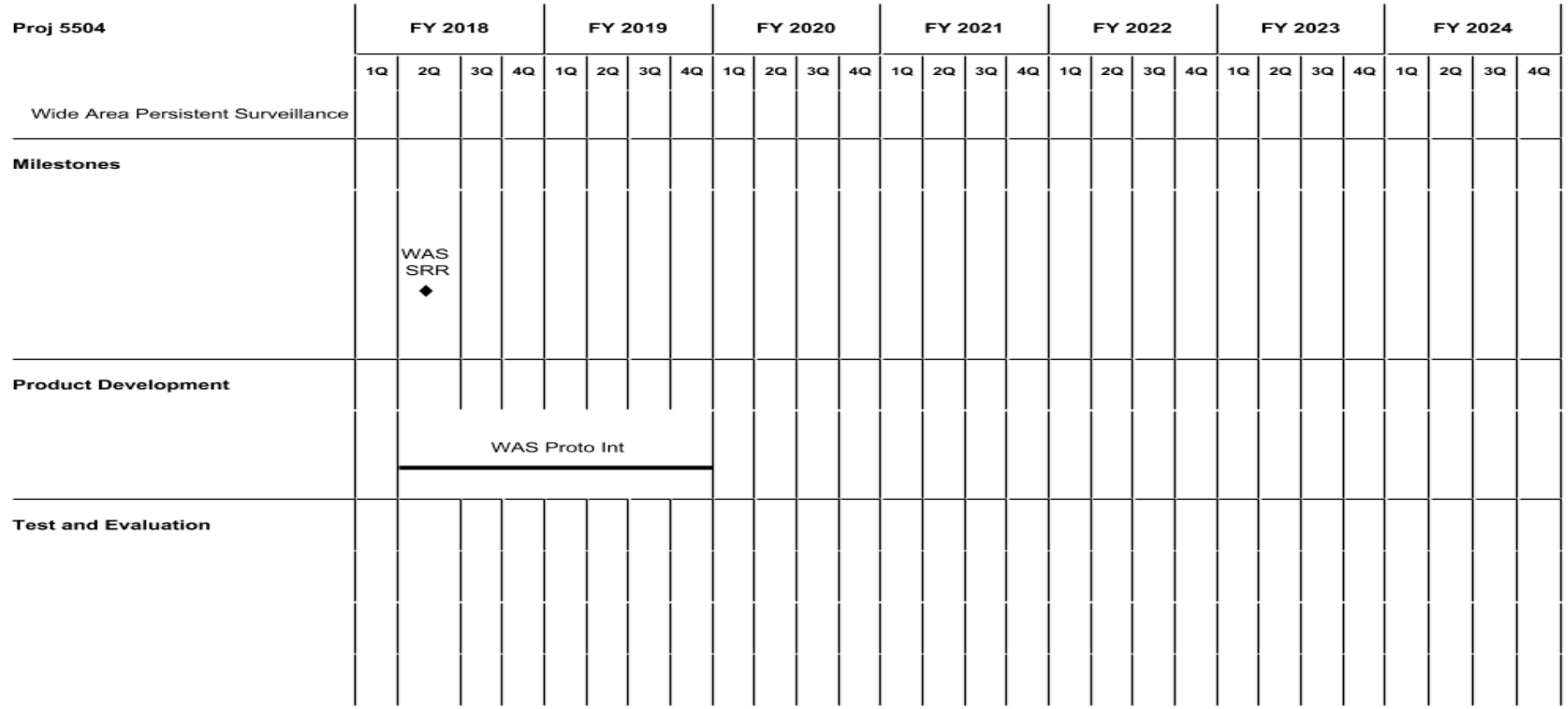
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	WR	NAWCAD : Patuxent River, MD	0.000	0.249	Feb 2018	0.000		0.000		-		0.000	0.000	0.249	-
		Subtotal	0.000	0.249		0.000		0.000		-		0.000	0.000	0.249	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	7.029		0.000		0.000		-		0.000	0.000	7.029	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5504 / *Wide Area Persistent Surveillance (TNWAS)*



2020PB - 0305242M - 5504

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305242M / *(U)Unmanned Aerial Systems (UAS) Payloads*	**Project (Number/Name)** 5504 / *Wide Area Persistent Surveillance (TNWAS)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 5504				
Milestones: WAS System Requirement Review	2	2018	2	2018
Product Development: WAS Prototype Integration	2	2018	4	2019

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305421N *I (U)RQ-4 Modernization*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	294.369	224.249	219.403	202.346	-	202.346	71.964	115.546	103.921	97.393	75.000	1,404.191
2939: *RQ-4 Modernization*	294.369	224.249	219.403	202.346	-	202.346	71.964	115.546	103.921	97.393	75.000	1,404.191
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 373												

Note

MQ-4C Triton RDT&E funding for modernization was segregated into a new program element (from PE 0305220N to PE 0305421N) for increased transparency.

A. Mission Description and Budget Item Justification

MQ-4C Triton Unmanned Air System (UAS). The popular name Triton was approved for the MQ-4C UAS in June 2012, designating the RQ-4 Broad Area Maritime Surveillance UAS as the MQ-4C Triton.

The MQ-4C Triton is a high altitude-long endurance UAS designed to provide Fleet and combatant commanders with persistent maritime Intelligence, Surveillance and Reconnaissance (ISR) of nearly all the world's high-density sea-lanes, littorals, and areas of national interest. Teamed with its manned-capability counterpart, the P-8A, Triton will be a key component of the Navy's family of systems to achieve maritime domain awareness. MQ-4C Triton will seek to leverage Maritime Patrol and Reconnaissance Force manpower, training and maintenance efficiencies.

The MQ-4C Triton features sensors designed to provide near worldwide coverage through a network of five orbits inside and outside continental United States, with sufficient air vehicles to remain airborne for 24 hours a day, 7 days a week, out to ranges of 2,000 nautical miles. Onboard sensors will provide detection, classification, tracking and identification of maritime targets and include maritime radar, electro-optical/infra-red and Electronic Support Measures systems. Additionally, the MQ-4C will have a communications relay capability designed to link dispersed forces in the theater of operations and serve as a node in the Navy's networked strategy. Tactical-level data analysis will occur in real-time at shore-based mission control sites connected to the air vehicle via satellite communications. Further intelligence exploitation can be conducted at Fleet shore-based sites or aboard aircraft carriers and other ships.

The MQ-4C Triton UAS will implement phased capability upgrades within the ongoing acquisition program to pace capability with rapidly evolving technologies and threats to ensure the Navy maintains persistent ISR dominance through the system's lifecycle, and to support the Maritime Intelligence, Surveillance, Reconnaissance and Targeting (MISR&T) transition plan. System upgrades will include Multi-Intelligence capabilities, Counter Electronic Attack upgrades, a more robust electronic support capability, and continued improvements to baseline mission system payloads.

The MQ-4C air vehicle, mission control system, specialized sensors, and communications suite will play a significant role in achieving the Navy's strategic vision for the 21st century. The Triton system as a persistence ISR enabler provides the supported combatant commander and fleet commander with unparalleled situational awareness of the maritime battle space to develop and sustain the common operational tactical picture. The system will also serve as a Fleet response plan enabler with a persistent, global force offering to provide critical trip wire information for intelligence preparation of the environment. Triton will connect to both the Global

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305421N *I (U)RQ-4 Modernization*

Information Grid and the Distributed Common Ground System-Navy information backbone to provide the Warfighter with unprecedented levels of battlespace awareness to synchronize actions necessary to maintain maritime Full Spectrum Superiority.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	229.404	219.894	136.526	-	136.526
Current President's Budget	224.249	219.403	202.346	-	202.346
Total Adjustments	-5.155	-0.491	65.820	-	65.820
• Congressional General Reductions	-	-0.491			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.067	0.000			
• Program Adjustments	0.000	0.000	66.000	-	66.000
• Rate/Misc Adjustments	-0.002	0.000	-0.180	-	-0.180
• Congressional General Reductions Adjustments	-0.186	-	-	-	-
• Congressional Directed Reductions Adjustments	-4.900	-	-	-	-

Change Summary Explanation

FY 2020 funding increases by $66 million to adequately resource Multi-INT (IFC-4.0) system development and accelerate IFC-5.0 phased capability development.

Schedule:
Baseline Early Operational Capability (EOC) moved 5 Quarters to 3rd Quarter FY 2019 due to schedule delays during the operational test period and the operational pause in flight test resulting from an aircraft mishap in September 2018
Multi-INT EOC moved 2 Quarters to 2nd Quarter FY 2021 due to delayed completion of retrofit aircraft
Baseline Operational Test Event end date changed to align to the planned System Development and Demonstration completion of 2nd Quarter FY 2019
Updated schedule to reflect Airframe Fatigue Testing and Analysis start of 2nd Quarter FY 2018
Initiate Integrated Functional Capability (IFC-5.0) development 1st Quarter FY 2020

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0305421N / *(U)RQ-4 Modernization*				Project (Number/Name) 2939 / *RQ-4 Modernization*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2939: *RQ-4 Modernization*	294.369	224.249	219.403	202.346	-	202.346	71.964	115.546	103.921	97.393	75.000	1,404.191
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 373

A. Mission Description and Budget Item Justification

MQ-4C Triton Unmanned Air System (UAS). The MQ-4C Triton is a high altitude-long endurance UAS designed to provide Fleet and combatant commanders with persistent maritime Intelligence, Surveillance and Reconnaissance (ISR) of nearly all the world's high-density sea-lanes, littorals, and areas of national interest. Teamed with its manned-capability counterpart, the P-8A, Triton will be a key component of the Navy's family of systems to achieve maritime domain awareness. MQ-4C Triton will seek to leverage Maritime Patrol and Reconnaissance Force manpower, training and maintenance efficiencies.

The MQ-4C Triton features sensors designed to provide near worldwide coverage through a network of five orbits inside and outside continental United States, with sufficient air vehicles to remain airborne for 24 hours a day, 7 days a week, out to ranges of 2,000 nautical miles. Onboard sensors will provide detection, classification, tracking and identification of maritime targets and include maritime radar, electro-optical/infra-red and Electronic Support Measures systems. Additionally, the MQ-4C will have a communications relay capability designed to link dispersed forces in the theater of operations and serve as a node in the Navy's networked strategy. Tactical-level data analysis will occur in real-time at shore-based mission control sites connected to the air vehicle via satellite communications. Further intelligence exploitation can be conducted at Fleet shore-based sites or aboard aircraft carriers and other ships.

The MQ-4C Triton UAS will implement phased capability upgrades within the ongoing acquisition program to pace capability with rapidly evolving technologies and threats to ensure the Navy maintains persistent ISR dominance through the system's lifecycle, and to support the Maritime Intelligence, Surveillance, Reconnaissance and Targeting (MISR&T) transition plan. System upgrades will include Multi-Intelligence capabilities, Counter Electronic Attack upgrades, a more robust electronic support capability and continue improvements to baseline mission system payloads.

The MQ-4C air vehicle, mission control system, specialized sensors, and communications suite will play a significant role in achieving the Navy's strategic vision for the 21st century. The Triton system as a persistence ISR enabler provides the supported combatant commander and fleet commander with unparalleled situational awareness of the maritime battle space to develop and sustain the common operational tactical picture. The system will also serve as a Fleet response plan enabler with a persistent, global force offering to provide critical trip wire information for intelligence preparation of the environment. Triton will connect to both the Global Information Grid and the Distributed Common Ground System-Navy information backbone to provide the Warfighter with unprecedented levels of battlespace awareness to synchronize actions necessary to maintain maritime Full Spectrum Superiority.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Title: Product Development	211.326	202.555	183.671	0.000	183.671
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305421N / *(U)RQ-4 Modernization*	**Project (Number/Name)** 2939 / *RQ-4 Modernization*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: MQ-4C Triton Unmanned Air System (UAS) modernization effort for incorporation of phased capability upgrades. The prime contractor is responsible for integration of upgrades into the Triton UAS including associated management, engineering and logistics activities. Capability upgrades will also include development of system payloads directly with original equipment manufacturers. ***FY 2019 Plans:*** FY 2019 continues development of capability upgrades as the program continues test asset modification and software development, including Multi-Intelligence capabilities in support of the Intelligence, Surveillance, Reconnaissance and Targeting transition plan. Funding includes Sense and Avoid radar development, AMP development and integration of development assets for capability upgrades including electro-optical/infra-red, SIGINT High Band and SIGINT Low Band systems. ***FY 2020 Base Plans:*** FY 2020 continues development of capability upgrades as the program continues test asset modification and software development, including Multi-Intelligence capabilities in support of the Intelligence, Surveillance, Reconnaissance and Targeting transition plan. Funding includes Electromagnetic Interference (EMI) corrective actions, Sense and Avoid radar (IFC-5.0) development, AMP development and integration of development assets for capability upgrades including electro-optical/infra-red, SIGINT High Band and SIGINT Low Band systems. The major phased capability improvement for IFC-5.0 is the Sense and Avoid Radar (SAAR) which includes planned improvements to the integrated mission management computer (IMMC), collision avoidance systems (CAS) and size/weight/power criteria. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2020 reflects the decrease in funding required for development of phased capability upgrades, driven primarily by the transition of High Gain Common Data Link work, part of IFC-4.0 efforts, at L-3 in FY 2019 and a reduction in Systems Engineering efforts.					
Title: ILS, Support, Studies & Analysis	2.679	2.789	2.845	0.000	2.845
Articles:	-	-	-	-	-
Description: Integrated Logistics Support, Studies and Analysis. ***FY 2019 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305421N / *(U)RQ-4 Modernization*	**Project (Number/Name)** 2939 / *RQ-4 Modernization*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funding continues in FY 2019 to support the development and integration of logistics and product support considerations for Triton's modernization upgrade. Efforts include integrated logistics support, technical engineering services, sensor reliability and maintainability risk reduction, logistics supportability analyses and environmental planning, modeling and simulation, development of manpower and basing assessments, and development of technical data to support fielding of the MQ-4C Triton UAS modernization capabilities. ***FY 2020 Base Plans:*** Funding continues in FY 2020 to support the development and integration of logistics and product support considerations for Triton's modernization upgrade. Efforts include integrated logistics support, technical engineering services, sensor reliability and maintainability risk reduction, logistics supportability analyses and environmental planning, modeling and simulation, development of manpower and basing assessments, and development of technical data to support fielding of the MQ-4C Triton UAS modernization capabilities. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in FY 2020 reflects initiation of IFC-5.0 Risk Reduction.					
Title: Test & Evaluation (T&E) ***Articles:*** ***Description:*** T&E efforts. ***FY 2019 Plans:*** Funding continues in FY 2019 to support DT activities, including integrated test team labor to reduce risk in design and development, to perform subsystem level ground and acceptance testing, obtain the necessary satellite communications required for testing and continue OT support to allow test and fielding of the MQ-4C Triton UAS phased capability upgrades in accordance with the program schedule. Increase from FY 2018 to FY 2019 in preparation for the start of IFC 4.0 ground and flight test. ***FY 2020 Base Plans:*** Funding continues in FY 2020 to support DT activities, including integrated test team labor to reduce risk in design and development, to perform subsystem level ground and acceptance testing, obtain the necessary satellite communications required for testing and continue OT support to allow test and fielding of the MQ-4C Triton UAS phased capability upgrades in accordance with the program schedule. ***FY 2020 OCO Plans:***	7.541 -	12.259 -	13.996 -	0.000 -	13.996 -

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305421N / *(U)RQ-4 Modernization*	**Project (Number/Name)** 2939 / *RQ-4 Modernization*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase funds support integration testing of IFC-4.0 to support Multi-Int EOC in early FY 2021.					
Title: Program Management (PM)	2.703	1.800	1.834	0.000	1.834
Articles:	-	-	-	-	-
Description: PM support and travel. ***FY 2019 Plans:*** Continue the following: PM support and travel, development of milestone and acquisition-related documentation, capability refinement and open systems architecture development, resource justification, affordability assessments and cost analyses, risk reduction and risk management, system integration and interoperability planning, technology maturity reviews, program protection planning, corrosion prevention planning, and joint and international cooperation efforts. ***FY 2020 Base Plans:*** Continue the following: PM support and travel, development of milestone and acquisition-related documentation, capability refinement and open systems architecture development, resource justification, affordability assessments and cost analyses, risk reduction and risk management, system integration and interoperability planning, technology maturity reviews, program protection planning, corrosion prevention planning, and joint and international cooperation efforts. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase for program and analysis support of integration testing of IFC-4.0 to support Multi-Int EOC in early FY 2021.					
Accomplishments/Planned Programs Subtotals	224.249	219.403	202.346	0.000	202.346

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDT&E/0305220N: *(U)MQ-4C Triton*	94.115	14.395	11.784	-	11.784	11.375	14.057	14.337	14.623	0.000	3,570.815

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305421N / *(U)RQ-4 Modernization*	**Project (Number/Name)** 2939 / *RQ-4 Modernization*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0442: *MQ-4 Triton*	552.806	602.539	493.273	-	493.273	523.992	623.077	632.308	712.354	5,608.478	10,798.811
• APN/0605/J0442: *Spares and Repair Parts*	114.652	43.903	171.874	-	171.874	4.730	11.861	2.793	0.000	0.000	549.618
• APN/0596: *MQ-4 Series*	13.296	48.278	27.994	-	27.994	12.992	36.992	50.991	17.990	0.000	208.533
• OMN/1D4D: *Weapons Maintenance*	9.996	16.220	23.902	-	23.902	37.407	45.926	46.869	47.827	Continuing	Continuing

Remarks

D. Acquisition Strategy

The MQ-4C Triton acquisition approach supports the Navy's Maritime Intelligence, Surveillance, Reconnaissance, and Targeting (MISR&T) Transition Plan by providing a stable and effective baseline early operational capability (EOC) in 2018 to facilitate Fleet introduction and learning while continuing System Development and Demonstration engineering and integrated test on Signals Intelligence (SIGINT) and other upgrades to deliver a Multi-INT configuration at Initial Operational Capability (IOC). Phased capability upgrades will continue post IOC to enable the MQ-4C Triton to keep pace with rapidly evolving technologies and threats, and address correction of deficiencies and obsolescence issues to ensure the Navy maintains persistent Intelligence, Surveillance and Reconnaissance dominance through the system's lifecycle.

E. Performance Metrics

Successfully achieve Operational Evaluation and EOC.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305421N / *(U)RQ-4 Modernization*	**Project (Number/Name)** 2939 / *RQ-4 Modernization*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	C/CPFF	Northrop Grumman : Rancho Bernardo, CA	167.129	141.386	Nov 2017	149.631	Nov 2018	152.478	Nov 2019	-		152.478	268.035	878.659	878.659
Systems Engineering	Various	Various : Various	24.229	8.000	Nov 2017	7.750	Nov 2018	0.750	Nov 2019	-		0.750	0.250	40.979	-
Systems Engineering	WR	NAWC-AD : Patuxent River, MD	32.088	23.462	Nov 2017	22.391	Nov 2018	21.643	Nov 2019	-		21.643	83.711	183.295	-
Primary Hardware Development	SS/FFP	Raytheon : McKinney, TX	6.979	0.000	Nov 2017	0.000		0.000		-		0.000	0.000	6.979	6.979
Primary Hardware Development	C/CPFF	Sierra Nevada Corporation : Beaver Creek, OH	6.500	6.500	Jan 2018	0.000		0.000		-		0.000	0.000	13.000	13.000
Primary Hardware Development	C/CPFF	Boeing Argon ST : Fairfax, VA	5.128	0.000		0.000		0.000		-		0.000	0.000	5.128	5.128
Primary Hardware Development	C/CPFF	Ticom Geomatics : Austin, TX	5.000	6.281	Jan 2018	6.800	Jan 2019	7.000	Jan 2020	-		7.000	14.000	39.081	39.081
Primary Hardware Development	WR	NSWC-Crane : Crane, Indiana	21.230	14.250	Nov 2017	0.050	Nov 2018	0.050	Nov 2019	-		0.050	0.100	35.680	-
Primary Hardware Development	C/CPFF	L-3 Communication Systems : Salt Lake City, UT	0.000	7.757	Jan 2018	12.243	Jan 2019	0.000		-		0.000	0.000	20.000	20.000
Systems Engineering	C/CPFF	Mitre : Mclean, VA	3.070	1.990	Nov 2017	1.990	Nov 2018	1.000	Nov 2019	-		1.000	5.000	13.050	13.050
Systems Engineering	C/CPFF	MIT-Lincoln Labs : Lexington, MA	4.066	1.700	Nov 2017	1.700	Nov 2018	0.750	Nov 2019	-		0.750	3.750	11.966	11.966
		Subtotal	275.419	211.326		202.555		183.671		-		183.671	374.846	1,247.817	N/A

Remarks

The Product Development budget resources Northrop Grumman for Multi-Intelligence integration design efforts, Raytheon for an Electro-Optical/Infrared (EO/IR) upgrade contract, Sierra Nevada Corporation for high band sensor kits, Boeing Argon for low band sensor kits, Ticom Geomatics for networking, L-3 Communication Systems for High Gain Common Data Link, NSWC-Crane for Airborne Mission Processor design and MITRE/MIT-LL for Airspace Integration efforts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305421N / *(U)RQ-4 Modernization*	Project (Number/Name) 2939 / *RQ-4 Modernization*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	Various	Various : Various	1.566	0.529	Nov 2017	0.539	Nov 2018	0.550	Nov 2019	-		0.550	1.250	4.434	-
Integrated Logistics Support	Various	Various : Various	1.325	0.800	Nov 2017	0.873	Nov 2018	0.890	Nov 2019	-		0.890	2.806	6.694	-
Integrated Logistics Support	WR	NAWC-AD : Patuxent River, MD	2.393	1.350	Nov 2017	1.377	Nov 2018	1.405	Nov 2019	-		1.405	5.385	11.910	-
		Subtotal	5.284	2.679		2.789		2.845		-		2.845	9.441	23.038	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	Various	Various : Various	1.261	0.676	Nov 2017	0.690	Nov 2018	0.704	Nov 2019	-		0.704	3.720	7.051	-
Developmental Test & Evaluation	WR	NAWC-AD : Patuxent River, MD	7.122	5.855	Nov 2017	10.069	Nov 2018	11.498	Nov 2019	-		11.498	57.312	91.856	-
Operational Test & Evaluation	Various	Various : Various	0.500	0.510	Nov 2017	0.500	Nov 2018	0.794	Nov 2019	-		0.794	10.100	12.404	-
Developmental Test & Evaluation (SATCOMM)	MIPR	DITCO : Various	0.181	0.500	Nov 2017	1.000	Nov 2018	1.000	Nov 2019	-		1.000	5.000	7.681	-
		Subtotal	9.064	7.541		12.259		13.996		-		13.996	76.132	118.992	N/A

Management Services ($ in Millions)

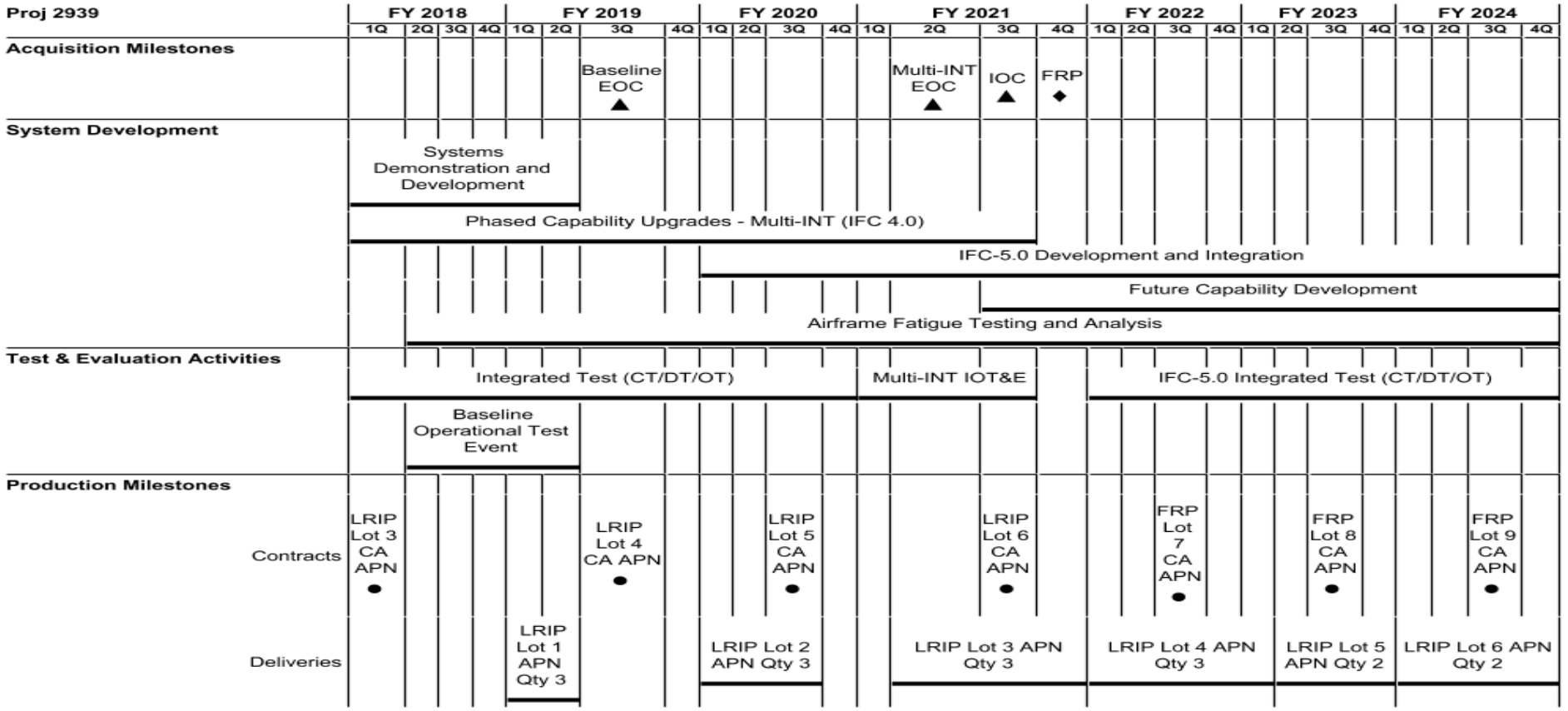
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Various : Various	0.496	0.170	Nov 2017	0.173	Nov 2018	0.176	Nov 2019	-		0.176	0.900	1.915	-
Travel	Allot	Various : Various	0.106	0.033	Nov 2017	0.034	Nov 2018	0.035	Nov 2019	-		0.035	0.184	0.392	-
Program Management Support	C/CPFF	Ausley : Lexington Park, MD	4.000	2.500	Nov 2017	1.593	Nov 2018	1.623	Nov 2019	-		1.623	3.655	13.371	13.371
		Subtotal	4.602	2.703		1.800		1.834		-		1.834	4.739	15.678	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0305421N / *(U)RQ-4 Modernization*	Project (Number/Name) 2939 / *RQ-4 Modernization*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	294.369	224.249		219.403		202.346		-		202.346	465.158	1,405.525	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305421N / *(U)RQ-4 Modernization*	**Project (Number/Name)** 2939 / *RQ-4 Modernization*



2020PB - 0305421N - 2939 MQ-4C Triton development activities are resourced by PE 0305220N and PE 0305421N. Schedule updated to reflect changes in acquisition and production milestones and planned system development efforts to include fatigue testing and analysis and initiation of the IFC 5.0 development and test efforts. The LRIP Lot 2 contract is comprised of 1 FY16 and 2 FY17 resourced aircraft.

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305421N / *(U)RQ-4 Modernization*	**Project (Number/Name)** 2939 / *RQ-4 Modernization*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2939				
Acquisition Milestones: Full Rate Production	4	2021	4	2021
Acquisition Milestones: Initial Operational Capability	3	2021	3	2021
Acquisition Milestones: Multi-INT Early Operational Capability	2	2021	2	2021
Acquisition Milestones: Baseline Early Operational Capability	3	2019	3	2019
System Development: System Development and Demonstration	1	2018	2	2019
System Development: Phased Capability Upgrades - Multi-INT (IFC 4.0)	1	2018	3	2021
System Development: IFC-5.0 Development and Integration	1	2020	4	2024
System Development: Future Capability Development	3	2021	4	2024
System Development: Airframe Fatigue Testing and Analysis	2	2018	4	2024
Test & Evaluation Activities: Integrated Test (Combined/Developmental/Operational)	1	2018	4	2020
Test & Evaluation Activities: Multi-INT Initial Operational Test and Evaluation	1	2021	3	2021
Test & Evaluation Activities: IFC-5.0 Integrated Test (Combined/Developmental/ Operational)	1	2022	4	2024
Test & Evaluation Activities: Baseline Operational Test Event	2	2018	2	2019
Production Milestones: Contracts: Low Rate Initial Production Lot 3 Contract Award	1	2018	1	2018
Production Milestones: Contracts: Low Rate Initial Production Lot 4 Contract Award	3	2019	3	2019
Production Milestones: Contracts: Low Rate Initial Production Lot 5 Contract Award	3	2020	3	2020
Production Milestones: Contracts: Low Rate Initial Production Lot 6 Contract Award	3	2021	3	2021
Production Milestones: Contracts: Full Rate Production Lot 7 Contract Award	3	2022	3	2022
Production Milestones: Contracts: Full Rate Production Lot 8 Contract Award	3	2023	3	2023
Production Milestones: Contracts: Full Rate Production Lot 9 Contract Award	3	2024	3	2024
Production Milestones: Deliveries: Low Rate Initial Production Lot 1 Delivery	1	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0305421N / *(U)RQ-4 Modernization*	**Project (Number/Name)** 2939 / *RQ-4 Modernization*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Production Milestones: Deliveries: Low Rate Initial Production Lot 2 Delivery	1	2020	3	2020
Production Milestones: Deliveries: Low Rate Initial Production Lot 3 Delivery	2	2021	4	2021
Production Milestones: Deliveries: Low Rate Initial Production Lot 4 Delivery	1	2022	1	2023
Production Milestones: Deliveries: Low Rate Initial Production Lot 5 Delivery	2	2023	4	2023
Production Milestones: Deliveries: Low Rate Initial Production Lot 6 Delivery	1	2024	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0308601N *I Modeling & Simulation Support*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	39.854	5.038	7.097	7.119	-	7.119	7.291	7.465	7.641	7.794	Continuing	Continuing
2222: *Modeling & Simulation*	39.854	5.038	7.097	7.119	-	7.119	7.291	7.465	7.641	7.794	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element addresses projects under the Navy Modeling and Simulation (M&S) Office. It supports technical and management initiatives directed by Congress, Department of Defense (DoD), Secretary of the Navy (SECNAV), and Chief of Naval Operations (CNO) with the aim of bringing organization, focus, and efficiency to the development and use of M&S throughout the Navy and DoD. It provides a central agency for the formulation and implementation of policy and guidance in M&S, and represents Navy interests in Joint and other Agency initiatives. It funds efforts to define and coordinate the corporate Navy M&S policy and guidance to evolve an interoperable and reusable core M&S capability consistent with the M&S technical framework prescribed by DoD.

Efforts are organized around three product areas:
(1) Core Services: This activity provides essential planning and coordination of M&S efforts with other Services, the Office of Secretary of Defense (OSD), the Joint Staff, and other agencies to develop policies and procedures necessary for M&S standards, visibility, and potential reuse across DoD.
(2) Community Services: This activity provides M&S subject matter expert support embedded in the Navy M&S Communities to recommend implementations for M&S policies, standards, VV&A, and reuse within their Community and to ensure that the wider DON and DoD are aware (visibility) of the M&S products and services, initiatives, processes, and standards.
(3) Community Experiments and Prototypes: This activity conducts experiments and prototypes aimed at determining the feasibility and applicability of proposed standards or technical approaches to Navy M&S and investigates Service-unique requirements for standards or guidance to achieve M&S efficiencies.

B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	5.238	7.097	7.119	-	7.119
Current President's Budget	5.038	7.097	7.119	-	7.119
Total Adjustments	-0.200	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.200	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0308601N *I Modeling & Simulation Support*

Change Summary Explanation

200K reduction in 2018 delays DON M&S Forum tasks to share efforts, best practices and lessons learned.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0308601N / *Modeling & Simulation Support*	Project (Number/Name) 2222 / *Modeling & Simulation*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2222: *Modeling & Simulation*	39.854	5.038	7.097	7.119	-	7.119	7.291	7.465	7.641	7.794	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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Efforts are organized around three product areas:
(1) Core Services: This activity provides essential planning and coordination of M&S efforts with other Services, the Office of Secretary of Defense (OSD), the Joint Staff, and other agencies to develop policies and procedures necessary for M&S standards, visibility, and potential reuse across DoD.
(2) Community Services: This activity provides M&S subject matter expert support embedded in the Navy M&S Communities to recommend implementations for M&S policies, standards, VV&A, and reuse within their Community and to ensure that the wider DON and DoD are aware (visibility) of the M&S products and services, initiatives, processes, and standards.
(3) Community Experiments and Prototypes: This activity conducts experiments and prototypes aimed at determining the feasibility and applicability of proposed standards or technical approaches to Navy M&S and investigates Service-unique requirements for standards or guidance to achieve M&S efficiencies.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: CORE SERVICES	0.950	1.032	1.035	0.000	1.035
Articles:	-	-	-	-	-
Description: This activity provides essential planning and coordination of M&S efforts with other Services, the Office of Secretary of Defense (OSD), the Joint Staff, and other agencies to develop policies and procedures necessary for M&S visibility and potential reuse across DoD. It provides updates to the Navy M&S website, M&S Master Plan, and M&S Investment Strategy. This activity supports development of common services, tools, and databases to ensure the integration and connectivity of M&S products employed in Naval assessments, training, acquisition, and among operational communities. It manages and maintains the Navy M&S Information Service (NMSIS), the central Naval M&S information resource to support informed M&S investment decision making across DON. It implements and manages the Modeling and Simulation (M&S) Quality Assurance (VV&A) process and guidelines for implementing for modeling, simulation, and data. It					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0308601N / *Modeling & Simulation Support*	**Project (Number/Name)** 2222 / *Modeling & Simulation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
reviews both new and legacy M&S VV&A plans and reports and develops and maintains the Naval M&S VV&A repository. It establishes and implements a VV&A training curriculum for developers and Accreditation Agents. ***FY 2019 Plans:*** - Promote consistent application of M&S "Best Practices" and associated technologies to improve support across the DON Enterprise. - Review and Update the Verification, Validation and Accreditation (VV&A) policy and guidance. - Educate the M&S workforce on use of M&S to support efficient and interoperable RDT&E. - Provide VV&A, Standards and M&S support to programs, PEOs and other DON activities. ***FY 2020 Base Plans:*** - Promote consistent application of M&S "Best Practices" and associated technologies to improve support across the DON Enterprise. - Review and Update the Verification, Validation and Accreditation (VV&A) policy and guidance. - Educate the M&S workforce on use of M&S to support efficient and interoperable RDT&E. - Provide VV&A, Standards and M&S support to programs, PEOs and other DON activities. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** There is no significant change from FY 2019 to FY 2020.					
Title: COMMUNITY SERVICES	1.258	1.737	1.700	0.000	1.700
Articles:	-	-	-	-	-
Description: This activity provides M&S subject matter expert support embedded in the Navy M&S Communities to recommend implementations for M&S policies and standards within their Community and to ensure that the wider DON is aware of the M&S products and services, initiatives, processes, and standards (visibility). It promotes M&S reuse through cooperative Community M&S activities which identify and prioritize M&S capability requirements between and across Communities. It also provides an M&S degree program through the Naval Postgraduate School (NPS), Modeling Virtual Environments and Simulation (MOVES) curriculum which qualifies officers to fill 6202-P coded billets. Financial support for thesis and dissertation efforts done by the students is covered by this funding. Topics are broad M&S topics of concern which are prioritized based on how they meet the requirements across, between and within the M&S Communities.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0308601N / *Modeling & Simulation Support*	**Project (Number/Name)** 2222 / *Modeling & Simulation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: - Develop open standards and architectures for M&S Communities' use which will foster Virtual Environments and M&S Enterprise Solutions. - Consolidate investment requirements of the M&S Communities to identify common or similar gaps and develop common solutions. - Develop DON Officer M&S postgraduate Knowledge requirements and submit to the M&S program at Naval Postgraduate School. - Fund DON M&S Forum tasks to share M&S efforts, Best Practices, and lessons learned. - Coordinate M&S workforce education across DON. - Train and educate workforce in efficient use of Live-Virtual-Constructive environments and VV&A of large-scale complex simulations. ***FY 2020 Base Plans:*** - Develop open standards and architectures for M&S Communities' use which will foster Virtual Environments and M&S Enterprise Solutions. - Consolidate investment requirements of the M&S Communities to identify common or similar gaps and develop common solutions. - Develop DON Officer M&S postgraduate Knowledge requirements and submit to the M&S program at Naval Postgraduate School. - Fund DON M&S Forum tasks to share M&S efforts, Best Practices, and lessons learned. - Coordinate M&S workforce education across DON. - Train and educate workforce in efficient use of Live-Virtual-Constructive environments and VV&A of large-scale complex simulations. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** There is no significant change from FY 2019 to FY 2020.					
Title: COMMUNITY EXPERIMENTS and PROTOTYPES	2.830	4.328	4.384	0.000	4.384
Articles:	-	-	-	-	-
Description: This activity conducts experiments and prototypes aimed at determining the feasibility and applicability of proposed standards or technical approaches to Navy M&S, and investigate Service-unique					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0308601N / *Modeling & Simulation Support*	**Project (Number/Name)** 2222 / *Modeling & Simulation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
requirements for standards or guidance. Individual efforts focus on developing or evaluating approaches to optimize training, assessments and acquisition functional, mission objectives through more efficient development and use of M&S. This activity develops methodologies and standards that will result in model and data reusability and interoperability through the formulation of a technical framework. These standards support the full range of architecture and engineering design requirements across the Navy. This activity also supports Fleet exercises and experiments through the application of distributed simulations across a wide variety of warfighting and supporting communities. Specifically, it develops and integrates appropriate M&S into Fleet Synthetic Training (FST), and develops simulation efforts to test and evolve the standards for models, interfaces, and data. It supports development of tools necessary to enable the seamless access and use of operationally relevant M&S products to support Navy training, warfare assessments and acquisition requirements. ***FY 2019 Plans:*** - Advance and efficiently integrate leading edge M&S capabilities in response to complex emerging threats and future warfighting environments. - Provide a comprehensive set of M&S capabilities and tools to support analysis, engineering, prototyping , testing, experimentation, and training to assess and address mission capability gaps and enhance interoperability. - Establish enterprise open architectures and standards. - Identify core models and simulations requiring integration. - Improve M&S networking environments to ensure labs and facilities are persistently connectable. - Validate scenario, simulation, and threat environments that can be reused across domains and throughout the program life-cycles. - Initiate development of a Common M&S Environment - Development of standards, architectures and open interfaces will add a new focus on integrating Live Navy Aircraft/Ship/Subs/Networks with Virtual simulations and Constructive models as well cyber effects in the battlespace. - Develop M&S modules in the Naval Integrated Capabilities database that will capture current DON Core Models, Simulations, and Data. Create an accessible repository of models, standards, relevant guidance and policy that will drive down cost. Develop a technical plan for incorporation of the Architecture Management Integration Environment and persistent connectivity across Navy M&S capabilities that will enable reuse and improved response time for LVC events.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0308601N / *Modeling & Simulation Support*	**Project (Number/Name)** 2222 / *Modeling & Simulation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Develop reusable M&S technologies in FY19 will add the integration of the Complex threat models (ITASE, DIADs, NGTS and TMAP models) in partnership with Intelligence Centers to create a high fidelity agile threat environment reusable across programs, domains (Air, Sea, Surface, Subsurface) and communities (Analysis, Acquisition, Training and Experimentation). -Experiments, model development efforts and simulation prototypes will include cyber effects modeling, virtualization methodologies for complex tactical code and improved visualization/virtual reality to support next generation M&S supporting emergent Naval warfighting requirements.					
FY 2020 Base Plans: - Advance and efficiently integrate leading edge M&S capabilities in response to complex emerging threats and future warfighting environments. - Provide a comprehensive set of M&S capabilities and tools to support analysis, engineering, prototyping , testing, experimentation, and training to assess and address mission capability gaps and enhance interoperability. - Establish enterprise open architectures and standards. - Identify core models and simulations requiring integration. - Improve M&S networking environments to ensure labs and facilities are persistently connectable. - Validate scenario, simulation, and threat environments that can be reused across domains and throughout the program life-cycles. - Initiate development of a Common M&S Environment - Development of standards, architectures and open interfaces will add a new focus on integrating Live Navy Aircraft/Ship/Subs/Networks with Virtual simulations and Constructive models as well cyber effects in the battlespace. - Develop M&S modules in the Naval Integrated Capabilities database that will capture current DON Core Models, Simulations, and Data. Create an accessible repository of models, standards, relevant guidance and policy that will drive down cost. Develop a technical plan for incorporation of the Architecture Management Integration Environment and persistent connectivity across Navy M&S capabilities that will enable reuse and improved response time for LVC events. - Develop reusable M&S technologies in FY20 will add the integration of the Complex threat models (ITASE, DIADs, NGTS and TMAP models) in partnership with Intelligence Centers to create a high fidelity agile threat environment reusable across programs, domains (Air, Sea, Surface, Subsurface) and communities (Analysis, Acquisition, Training and Experimentation).					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0308601N / *Modeling & Simulation Support*	**Project (Number/Name)** 2222 / *Modeling & Simulation*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Experiments, model development efforts and simulation prototypes will include cyber effects modeling, virtualization methodologies for complex tactical code and improved visualization/virtual reality to support next generation M&S supporting emergent Naval warfighting requirements. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** There is no significant change from FY 2019 to FY 2020.					
Accomplishments/Planned Programs Subtotals	5.038	7.097	7.119	0.000	7.119

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This is a non-ACAT program. The focus of the Navy Modeling and Simulation (M&S) Office is to facilitate and enable the efficient use of M&S by minimizing duplication of M&S efforts and maximize the reuse of M&S and data.

E. Performance Metrics

This program supports efforts to define, develop, and utilize M&S technologies, standards and techniques in DON and joint programs across a wide range of disciplines and technical arenas. As such, performance metrics are specific to individual projects initiated under this program element. Representative examples of performance criteria for M&S support include the following: VV&A of deployed M&S systems to support Fleet and Force missions and assessments; degree of composability and adaptability of system architectures employed M&S systems; ability of M&S systems to replicate and permit recreation of force or system interactions that otherwise would be performed by more labor-intensive or expensive personnel, forces, or elements; degree to which M&S frameworks would permit rapid integration and employment of analytic capabilities for the analysis and documentationof warfighter missions, weapons systems or Tactics, Techniques and Procedures (TT&P); and ability od a specific M&S technology or technique to meet the requirements specified in an individual project supported by this program.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0308601N / *Modeling & Simulation Support*	**Project (Number/Name)** 2222 / *Modeling & Simulation*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DoD Support	WR	SPAWAR : Charleston, SC	0.383	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
NMSO Director	WR	SPAWAR : Charleston, SC	1.825	0.282	Jan 2018	0.299	Feb 2019	0.300	Jan 2020	-		0.300	0.000	2.706	-
NMSO Data Archiving Effort	WR	NAVAIR : Pax River, MD	0.503	0.000		0.000		0.000		-		0.000	0.000	0.503	-
DREN Connectivity	WR	SPAWAR : Charleston, SC	0.043	0.000		0.000		0.000		-		0.000	0.000	0.043	-
M & S Data Lead	WR	SPAWAR : Charleston, SC	0.740	0.000		0.000		0.000		-		0.000	0.000	0.740	-
NMSIS Web Presence	WR	SPAWAR : Charleston, SC	0.896	0.000		0.000		0.000		-		0.000	0.000	0.896	-
VV&A Standards & Support	WR	NAVAIR : Pax River	1.567	0.251	Mar 2018	0.266	Mar 2019	0.270	Mar 2020	-		0.270	0.000	2.354	-
Plans & Policies	WR	SPAWAR : Charleston, SC	1.868	0.400	Oct 2017	0.466	Jan 2019	0.470	Oct 2019	-		0.470	0.000	3.204	-
DON Mission Level Gap Analysis	WR	NAVAIR : Pax River, MD	1.100	0.000		0.000		0.000		-		0.000	0.000	1.100	-
M&S Interopeperability Initiative	WR	NAVAIR : Pax River, MD	0.950	0.000		0.000		0.000		-		0.000	0.000	0.950	-
M&S Interopeperability Initiative	WR	SPAWAR : Charleston, SC	0.649	0.000		0.000		0.000		-		0.000	0.000	0.649	-
Navy Training Test Harness	WR	NAWC TSD : Orlando, FL	0.375	0.000		0.000		0.000		-		0.000	0.000	0.375	-
CSP for NTI	WR	NAWC TSD : Olando, FL	0.247	0.000		0.000		0.000		-		0.000	0.000	0.247	-
Navy STORM	MIPR	NAWC : Pax River, MD	0.500	0.000		0.000		0.000		-		0.000	0.000	0.500	-
USMC STORM	MIPR	USAF : Triangle, VA	0.500	0.000		0.000		0.000		-		0.000	0.000	0.500	-
M&S Services	WR	SPAWAR : Charleston, SC	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0308601N / *Modeling & Simulation Support*	Project (Number/Name) 2222 / *Modeling & Simulation*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Data Assistant	WR	SPAWAR : Charleston, SC	0.918	0.000		0.000		0.000		-		0.000	0.000	0.918	-
Navy VV&A Lead	WR	NAVAIR : Pax River, MD	0.428	0.000		0.000		0.000		-		0.000	0.000	0.428	-
Enterprise Level SBD M&S Components	WR	Various Warfare Centers : Not Specified	0.814	0.494	Oct 2017	0.865	Jan 2019	0.700	Oct 2019	-		0.700	0.000	2.873	-
LDUVV SBD Implementation Net-Centric Systems Test	WR	Various Warfare Centers : Not Specified	0.430	0.000		0.000		0.000		-		0.000	0.000	0.430	-
Net-Centric Systems Test Evaluation Capability Module -NECM	WR	NAVAIR : Pax River, MD	0.142	0.150	Oct 2017	0.150	Feb 2019	0.160	Oct 2019	-		0.160	0.000	0.602	-
Common Development Environment	WR	NAVAIR : Pax River, MD	0.519	0.495	Oct 2017	0.731	Jan 2019	0.735	Oct 2019	-		0.735	0.000	2.480	-
Architecture Framework	WR	NAVAIR : Pax River, MD	0.200	0.212	Oct 2017	0.212	Jan 2019	0.215	Oct 2019	-		0.215	0.000	0.839	-
MBSE SYSML Reference Architecture Standard	WR	Various Wafare Centers : Not Specified	0.000	0.212	Oct 2017	0.212	Feb 2019	0.215	Oct 2019	-		0.215	0.000	0.639	-
AMIE - Architecture Management Integration Environment	WR	NAVAIR : Pax River, MD	2.461	0.205	Feb 2018	0.200	Feb 2019	0.210	Feb 2020	-		0.210	0.000	3.076	-
M&S Integration Analysis	WR	Various Warfare Centers : Not Specified	0.000	0.139	Oct 2017	0.159	Jan 2019	0.165	Oct 2019	-		0.165	0.000	0.463	-
Common Development Enviroment Integration	WR	Various Warfare Centers : Not Specified	0.000	0.000		0.108	Jan 2019	0.108	Oct 2019	-		0.108	0.000	0.216	-
Architecture Integration	WR	Various Warfare Centers : Not Specified	0.000	0.318	Oct 2017	0.742	Feb 2019	0.750	Oct 2019	-		0.750	0.000	1.810	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0308601N / *Modeling & Simulation Support*	Project (Number/Name) 2222 / *Modeling & Simulation*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NAVAL - LIFT	WR	Various Warfare Centers : Not Specified	0.000	0.212	Oct 2017	0.367	Feb 2019	0.370	Oct 2019	-		0.370	0.000	0.949	-
M&S Visulation	WR	Various Warfare Centers : Not Specified	0.000	0.212	Oct 2017	0.318	Feb 2019	0.320	Oct 2019	-		0.320	0.000	0.850	-
		Subtotal	18.058	3.582		5.095		4.988		-		4.988	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RDA POC	WR	NAVAIR : Pax River, MD	1.538	0.308	Jan 2018	0.380	Jan 2019	0.396	Jan 2020	-		0.396	0.000	2.622	-
RDA IDS (#1&3)	WR	Various Warfare Centers : Not Specified	2.063	0.227	Jan 2018	0.238	Feb 2019	0.240	Jan 2020	-		0.240	0.000	2.768	-
Training IDS (#1)	WR	Various Warfare Centers : Not Specified	1.615	0.208	Mar 2018	0.246	Mar 2019	0.265	Mar 2020	-		0.265	0.000	2.334	-
Training IDS (#2)	WR	SPAWAR : Charleston, SC	0.951	0.000		0.000		0.000		-		0.000	0.000	0.951	-
Analysis IDS (#1)	WR	SPAWAR : Charleston, SC	0.000	0.000		0.233	Mar 2019	0.250	Mar 2020	-		0.250	0.000	0.483	-
Analysis IDS (#2)	WR	SPAWAR : Charleston, SC	0.058	0.000		0.000		0.000		-		0.000	0.000	0.058	-
IDS Training and Coordination	WR	SPAWAR : Charleston, SC	0.044	0.000		0.000		0.000		-		0.000	0.000	0.044	-
USMC IDS	WR	MCCDC : Quantico, VA	0.670	0.000		0.000		0.000		-		0.000	0.000	0.670	-
MOVES	WR	NPS : Monterrey, CA	4.274	0.314	Jan 2018	0.318	Feb 2019	0.330	Jan 2020	-		0.330	0.000	5.236	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0308601N / *Modeling & Simulation Support*	Project (Number/Name) 2222 / *Modeling & Simulation*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RDA M&S Forum	WR	NAVAIR : Pax River, MD	2.364	0.174	Jan 2018	0.173	Feb 2019	0.195	Jan 2020	-		0.195	0.000	2.906	-
NMSO Technical Support	WR	SPAWAR : Charleston, SC	0.483	0.000		0.000		0.000		-		0.000	0.000	0.483	-
Simulated Shipboard FMVS	WR	NWDC : Norfolk, VA	0.365	0.000		0.000		0.000		-		0.000	0.000	0.365	-
M&S Officer Postgraduate Ed	WR	SPAWAR : SSC-LANT	0.852	0.000		0.000		0.000		-		0.000	0.000	0.852	-
M&S Workforce Coordinator	WR	SPAWAR : SSC-PAX	0.000	0.000		0.149	Jan 2019	0.155	Oct 2019	-		0.155	0.000	0.304	-
		Subtotal	15.277	1.231		1.737		1.831		-		1.831	0.000	20.076	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Standard Interfaces for Virtual World	WR	NAVAIR : Pax River, MD	2.502	0.225	Feb 2018	0.265	Feb 2019	0.300	Feb 2020	-		0.300	0.000	3.292	-
Semantic and Structural Metedata Schema	WR	NAVAIR : Pax River, MD	0.562	0.000		0.000		0.000		-		0.000	0.000	0.562	-
Semantic and Structural Metedata Schema	WR	SPAWAR : Charleston, SC	0.289	0.000		0.000		0.000		-		0.000	0.000	0.289	-
Tactical Operational Software Environment (TOSEE)	WR	NAVAIR : TSD, Orlando	0.650	0.000		0.000		0.000		-		0.000	0.000	0.650	-
Cross Cultural Competence in OPS Environment	WR	NAVAIR : TSD, Orlando	0.350	0.000		0.000		0.000		-		0.000	0.000	0.350	-
Framework for Assessing Cost and Technology (FACT)	WR	MCCDC : Quantico, VA	0.500	0.000		0.000		0.000		-		0.000	0.000	0.500	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0308601N / *Modeling & Simulation Support*	Project (Number/Name) 2222 / *Modeling & Simulation*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Intergrated Air/Missle Defense IAMD	WR	NAVAIR : Pax River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Measuring Immersion Training	WR	MCCDC : Quantico, VA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
VVA of Real Time Propagation Loss Model	WR	ONR : Arlington, VA	0.588	0.000		0.000		0.000		-		0.000	0.000	0.588	-
Navy M&S Education Program	WR	NAVAIR : Pax River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Sensor Federate	WR	ONR : Pax River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Contracting Language for M&S	WR	NAVAIR : Pax River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
VCE for CPD&T	MIPR	WHS : Arlington, VA	0.300	0.000		0.000		0.000		-		0.000	0.000	0.300	-
Navy VV&A Lead	WR	NAVAIR : Pax River, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
LVC Training Enviroment Tech Advisor	WR	NAVSEA JHU : Wash. DC	0.567	0.000		0.000		0.000		-		0.000	0.000	0.567	-
Human Anatomy Motion Tracking & Display	WR	MARCORSYSCOM : Arlington, VA	0.091	0.000		0.000		0.000		-		0.000	0.000	0.091	-
CapabilityModule Enhancement	WR	NAVAIR : Pax River	0.120	0.000		0.000		0.000		-		0.000	0.000	0.120	-
		Subtotal	6.519	0.225		0.265		0.300		-		0.300	0.000	7.309	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	39.854	5.038		7.097		7.119		-		7.119	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0308601N / *Modeling & Simulation Support*	**Project (Number/Name)** 2222 / *Modeling & Simulation*

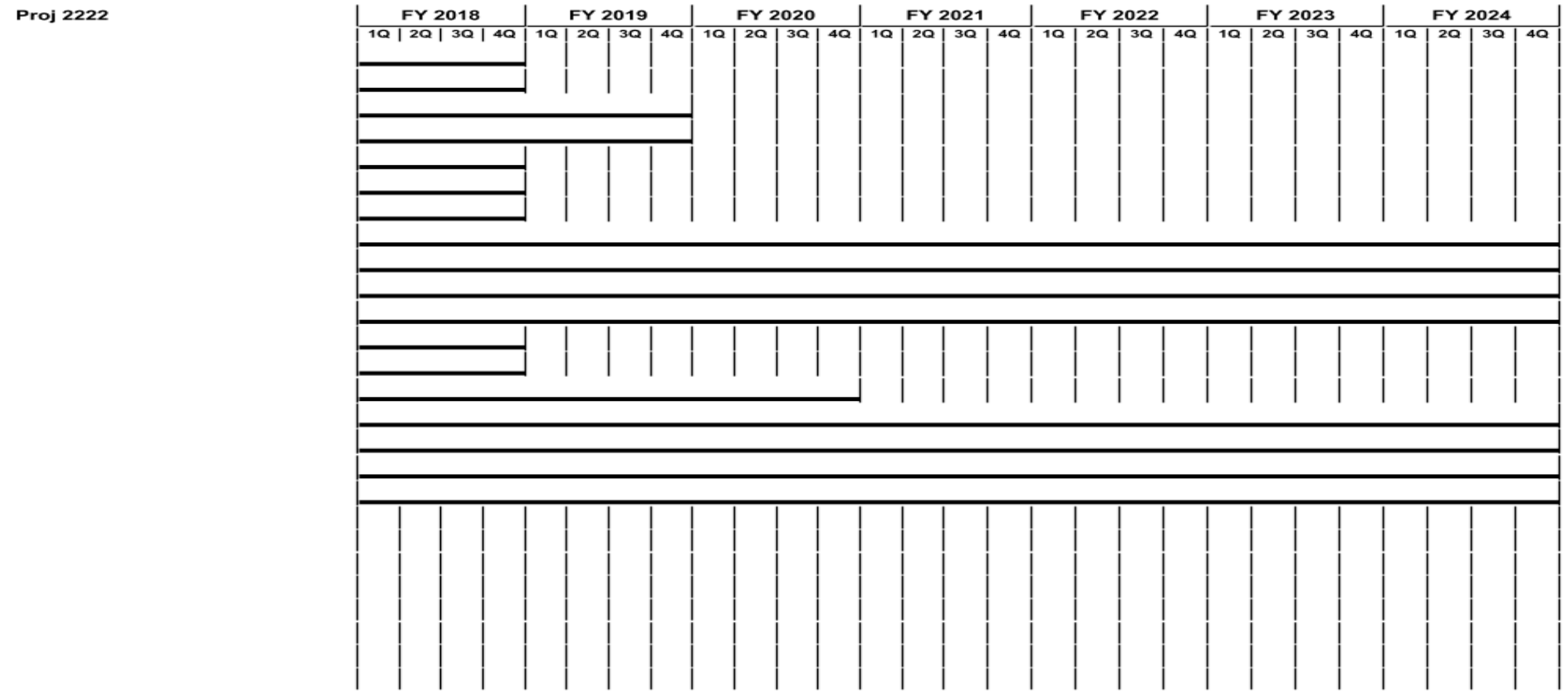

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0308601N / *Modeling & Simulation Support*	**Project (Number/Name)** 2222 / *Modeling & Simulation*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2222				
Incorporate Best Practices for Contracting M&S in DON	1	2018	4	2018
Publish M&S Contracting Best Practices Guide	1	2018	4	2018
Change Culture through Education, Outreach and Training	1	2018	4	2019
Host Summit for Face to Face Workshop on Issues and Reuse	1	2018	4	2019
Incorporate Learning courses in SYSCOM Workforce Education	1	2018	4	2018
Coordinate across DON and other Services/DoD to develop an M&S Support Plan	1	2018	4	2018
Establish draft MSSP Policy among the Services/DoD	1	2018	4	2018
Draft a Common Digital Environment	1	2018	4	2024
Coordinate quarterly Fleet Training Integration Panels	1	2018	4	2024
Plan Quarterly Fleet Training Requirements Management Group	1	2018	4	2024
Conduct Forums across all the Communities	1	2018	4	2024
JBUS AIME Integration to fix future LVC training integration issues	1	2018	4	2018
Aegis, Development Environment_AIME integration	1	2018	4	2018
Identify NR&DE capabilities for AMIE integration and conduct integration	1	2018	4	2020
Develop reference architecture and implementation for a common M&S engineering frameworks	1	2018	4	2024
Develop and deploy a Virtual Collaborative Environment in response to Enterprise Requirements	1	2018	4	2024
Identify and integrate MBSE tools and best practices	1	2018	4	2024
Update Enterprise level Naval Models and Simulations to ensure accurate operational representation and increased validity	1	2018	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0702207N *I Depot Maintenance (NON-IF)*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	234.849	35.463	46.560	38.182	-	38.182	40.313	48.889	49.609	27.823	Continuing	Continuing
3030: *FA-18 SLAP*	208.844	25.932	24.334	25.952	-	25.952	26.430	38.116	44.334	22.441	Continuing	Continuing
3182: *T-45 SLAP*	26.005	0.000	5.400	6.700	-	6.700	6.800	5.600	0.000	0.000	0.000	50.505
3384: *MH-60 SLAP*	0.000	9.531	6.826	5.530	-	5.530	7.083	5.173	5.275	5.382	Continuing	Continuing
9999: *Congressional Adds*	0.000	0.000	10.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.000

A. Mission Description and Budget Item Justification

3030: A significant portion of the F/A-18 and EA-18G airframe is believed to have additional inherent capability and a life extension may be possible for many portions of the airframe. The F/A-18 Service Life Assessment Program (SLAP) is assessing the structural and subsystem conditions of the F/A-18 fleet in order to determine what modifications are necessary to extend the aircraft designed life limits to allow it to achieve Chief of Naval Operations (CNO) inventory requirements. Without SLAP and the follow on Service Life Extension Program (SLEP), aircraft are retired from the USN inventory when a design service life metric is reached. RDTE funds will support aircraft teardown to validate SLAP analysis, identify unknown fatigue areas and assess the aircraft's material condition.

3182: The T-45 aircraft structure is currently fatigue limited to 14,400 flight hours based on initial full-scale fatigue tests. This service life limit prevents the T-45 fleet from meeting Integrated Production Plan (IPP) past 2025. Studies demonstrate that the 14,400 flight hour service life can be extended, with a Service Life Extension Program (SLEP), to 21,600 flight hours, which will support meeting IPP until 2035. A T-45 Structural Service Life Assessment Program (SLAP) was completed in February 2012. In order for the T-45 to meet IPP until 2035, it is also necessary to assess the subsystems of the T-45 in their ability to remain viable.

In FY13 an initial subsystem assessment, based on the updated fleet aircraft usage spectrum and future predicted training missions of the T-45 aircraft, found 79 dispositions requiring further analysis, teardowns, age explorations, recertification and/or testing . The assessment of the subsystems that make up these 79 dispositions will address all critical subsystems required and their ability to maintain IPP/NTR until 2035, analysis and studies will be conducted to outline improvements, assess manufacturing capabilities, prototype redesign and test of subsystems for trainer aircraft.

3384: The MH-60 SLAP is assessing the primary aircraft structure and subsystem condition of the MH-60S fleet in order to assess the airframe's ability to meet its designed service life of 10,000 hours and to determine what efforts are necessary to extend the aircraft design life limits to allow it to meet Chief of Naval Operations (CNO) operational inventory requirements through FY 2035. Without SLAP, aircraft are retired from the USN inventory when design service life limits are reached directly impacting fleet surface warfare, mine countermeasures, search and rescue, and vertical replenishment operational capabilities. FY 2020 budget request funds the completion of external loads analysis, continuation of fatigue analysis, and development of initial dispositions for safety critical items. This initial analysis, assessment and disposition will be further refined throughout the SLAP effort, augmented with specific system teardown, inspection and test, culminating in a follow-on SLEP recommendation, which will design and implement the solutions resulting from the SLAP findings.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0702207N *I Depot Maintenance (NON-IF)*

9999: FY 2019 Congressional Add funds MH-60S analysis and development of the 401D engine; the procurement of MH-60 alignment, tail cone, and pylon fixtures to support SLAP analysis, development of engineering technical data, drawings/models and associated lists from the Original Equipment Manufacturer (OEM) in support of SLAP deep look inspections.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

The FY 2020 funding request was increased by $1.668 million to add EA-18G SLAP tasking to the budget.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	38.227	36.560	41.525	-	41.525
Current President's Budget	35.463	46.560	38.182	-	38.182
Total Adjustments	-2.764	10.000	-3.343	-	-3.343
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.593	0.000			
• SBIR/STTR Transfer	-1.172	0.000			
• Program Adjustments	0.000	0.000	-3.295	-	-3.295
• Rate/Misc Adjustments	0.001	0.000	-0.048	-	-0.048

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *MH-60 SLAP*	0.000	10.000
Congressional Add Subtotals for Project: 9999	0.000	10.000
Congressional Add Totals for all Projects	0.000	10.000

Change Summary Explanation

Technical: PU 3182: Increase from FY2018 to FY2019 due to the T-45 SLAP Aviation Technical Corrections.

PU 3030: Funding increase of $1.668 million from FY 2019 to FY 2020 for addition of EA-18G SLAP tasking.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0702207N *I Depot Maintenance (NON-IF)*

PU 3384: Decrease from FY 2019 to FY 2020 due to the completion of Subsystem Life Assessment.

PU 9999: Decrease from FY 2019 to FY 2020 due to the T-700-401D Software development and MH-60 alignment tool to support SLAP analysis being a one time FY19 Congressional add.

Schedule:
PU 3030: Changes to the schedule to reflect the addition of EA-18G SLAP.

PU 3182: Changes support product development beginning in FY19 for Subsystem SLAP C to include teardown, inspection, detailed analysis and recertification testing required to safely extend the service life of critical subsystems.

PU 9999: Changes to the schedule to reflect the addition of T-700-401D Software development and MH-60 alignment tool.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0702207N / *Depot Maintenance (NON-IF)*	Project (Number/Name) 3030 / *FA-18 SLAP*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3030: *FA-18 SLAP*	208.844	25.932	24.334	25.952	-	25.952	26.430	38.116	44.334	22.441	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The F/A-18 and EA-18G Service Life Assessment Program (SLAP) is assessing the structural and subsystem conditions of the F/A-18 fleet in order to determine what modifications are necessary to extend the aircraft designed life limits to allow it to achieve Chief of Naval Operations (CNO) inventory requirements. The goal of the F/A-18 SLAP program is to identify critical structures and components that can achieve the extended service life limit goals. SLAP consists of structural investigations of the main landing gear, arresting hook and catapult back-up structures, vertical tails, wings and fuselage. A second effort is to evaluate the subsystem components (hydraulics, wiring, actuators, etc) to identify over and above inspections, overhaul intervals or replacement schedules to fly past design life limits. The current life limits for the F/A-18 E/F are 6,000 Flight Hours (FH), 2,250 catapults/arrestments (Cat/Traps) and 15,750 total landings. The F/A-18 SLAP program of record states the SLAP goals as 12,000 FH, 3,500 Cat/Traps and 22,500 total landings. The primary objective of F/A-18 and EA-18G SLAP is to determine if the stated SLAP goals are feasible. An increase in total landings and flight hours would allow the F/A-18 to meet CNO inventory requirements. The requirements are integrated with the Joint Strike Fighter planned introduction. This effort is required to be conducted for these airframes and subsystems to ascertain what actions and modifications must be taken to safely operate each system beyond its designed life until the targeted end of service life.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: F/A-18 SLAP	21.202	20.097	9.298	0.000	9.298
Articles:	-	-	-	-	-
Description: The current design life limits do not support USN inventory requirements. Funding supports assessing the structural condition of the F/A-18 fleet in order to determine what modifications are necessary to extend the aircraft designed life limits to allow it to achieve CNO inventory requirements.					
FY 2019 Plans: Continue stress analysis of numerous data points to provide exploitation of complete structural fatigue testing with the expectation of extending the current service life of F/A-18E/F from the design limits to the SLAP goals. Locations encompass the forward, center and aft fuselage, inner and outer wings, as well as landing gear. Sonic and Thermal analysis will be performed on numerous structural and composite skin locations to assess elevated temperatures with the expectation of extending the current life of the F/A-18E/F Super Hornet. Aircraft Teardown assessments continue to be performed to analyze the fatigue and material condition of fleet aircraft to determine					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3030 / *FA-18 SLAP*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
what modifications or inspections are required to extend the current life of the aircraft. Crack growth analysis will be performed to determine recurring requirements to extend the platform beyond its current service life limits. ***FY 2020 Base Plans:*** Continue stress analysis of numerous data points to provide exploitation of complete structural fatigue testing with the expectation of extending the current service life of F/A-18E/F from the design limits to the SLAP goals. Locations encompass the forward, center and aft fuselage, inner and outer wings, as well as landing gear. Sonic and Thermal analysis will be performed on numerous structural and composite skin locations to assess elevated temperatures with the expectation of extending the current life of the F/A-18E/F Super Hornet. Aircraft Teardown assessments continue to be performed to analyze the fatigue and material condition of fleet aircraft to determine what modifications or inspections are required to extend the current life of the aircraft. Crack growth analysis will be performed to determine recurring requirements to extend the platform beyond its current service life limits. Several ECPs have been developed and are being executed to address changes to the Aircraft fuselage and wing structure to meet a service life of 10,000 hours. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The F/A-18 E/F SLAP program is ramping down and the funding for this effort decreases from FY19 to FY20.					
Title: EA-18G SLAP	4.730	4.237	16.654	0.000	16.654
Articles:	-	-	-	-	-
Description: The current design life limits do not support USN inventory requirements. Funding supports assessing the structural condition of the EA-18G fleet in order to determine what modifications are necessary to extend the aircraft designed life limits to allow it to achieve CNO inventory requirements. The EA-18G SLAP program leveraged lessons learned from the F/A-18 A-F Slap program in order to achieve efficiencies in continuity of operations. ***FY 2019 Plans:*** Stress analysis of numerous data points to provide exploitation of complete structural fatigue testing with the expectation of extending the current service life of EA-18G from the design limits to the SLAP goals. Locations encompass the forward, center and aft fuselage, inner and outer wings, as well as landing gear. Sonic and Thermal analysis will be performed on numerous structural and composite skin locations to assess elevated temperatures with the expectation of extending the current life of the EA-18G Growler. Aircraft Teardown					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3030 / *FA-18 SLAP*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
assessments continue to be performed to analyze the fatigue and material condition of fleet aircraft to determine what modifications or inspections are required to extend the current life of the aircraft. Crack growth analysis will be performed to determine recurring requirements to extend the platform beyond its current service life limits. ***FY 2020 Base Plans:*** Continuation of ongoing stress analysis of numerous data points to provide exploitation of complete structural fatigue testing with the expectation of extending the current service life of EA-18G from the design limits to the SLAP goals. Locations encompass the forward, center and aft fuselage, inner and outer wings, as well as landing gear. Sonic and Thermal analysis will be performed on numerous structural and composite skin locations to assess elevated temperatures with the expectation of extending the current life of the EA-18G Growler. Aircraft Teardown assessments continue to be performed to analyze the fatigue and material condition of fleet aircraft to determine what modifications or inspections are required to extend the current life of the aircraft. Crack growth analysis will be performed to determine recurring requirements to extend the platform beyond its current service life limits. These engineering results will be used in development of Engineering Change Proposals (ECPs) that will address aircraft fuselage and wing structure changes required to meet service life beyond 7,500 hours. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase is to account for the ramping up of EA-18G specific SLAP efforts. The majority of prior-year SLAP efforts for the F/A-18 E/F and EA-18Gs were accomplished for the F/A-18 E/Fs first, with the expectation that EA-18Gs would follow. This increase reflects that transition period.					
Accomplishments/Planned Programs Subtotals	25.932	24.334	25.952	0.000	25.952

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/05250: *F-18 Series (OSIP 020-14)*	90.069	150.396	133.567	-	133.567	187.801	243.414	461.418	387.300	2,824.885	4,558.868

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3030 / *FA-18 SLAP*

D. Acquisition Strategy

The Service Life Assessment Program (SLAP) program employs sole source contracts with Boeing, the aircraft prime manufacturer. SLAP further decomposes program of record goals into smaller discrete steps, developing requirements to extend flight hours (FH) from 6,000 to 9,000 first. These efforts will provide the raw engineering data to develop aircraft modifications to extend total aircraft landings, Cat/Traps, and FH. The F/A-18 and EA-18G SLAP Program consists of two major engineering efforts: the aircraft structural assessment and the aircraft subsystems assessment. Both efforts are broken into multiple phases which develop tools and models, evaluate current aircraft usage, and develop concepts to extend aircraft life to meet CNO objectives. The program will combine exploitation of complete structural fatigue testing and actual fleet usage with the expectation of extending the service life of the F/A-18 aircraft. Conducting both F/A-18E/F and EA-18G SLAP to study the aircraft lifetime will provide a better estimate of aircraft service life and a follow on Service Life Extension Program (SLEP).

E. Performance Metrics

The F/A-18 and EA-18G SLAP provides an assessment of aircraft structure fatigue life as affected by flight maneuver, Cat/Traps and landings, based on actual usage and identifies the efforts required to extend the aircraft life to SLAP goals. During FA-18 E/F SLAP Structures Phase A (FY08-FY13) and EA-18G SLAP Structures Phase A (FY18-FY20) tools and modeling necessary to assess usage and fatigue life are developed. During FA-18 E/F SLAP Structures Phase B (FY11-FY18) and EA-18G SLAP Structures Phase B (FY20-FY23) specific structural locations which do not meet SLAP goals are identified and evaluated. Subsystem SLAP is also initiated concurrently with Structures Phase (B). A Flight Control Surface SLAP, SLEP retrofit concepts and repairs for deficient locations are developed during SLAP Structures and Sub-Systems Phase C (FY17-FY24). SLAP is followed by the SLEP during which the actual retrofit and repairs are performed under OSIP 020-14 established in FY14.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3030 / *FA-18 SLAP*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development SLAP F/A-18 E/F	SS/CPFF	Boeing : St. Louis, MO	143.353	18.317	Dec 2017	14.253	Dec 2018	7.286	Dec 2019	-		7.286	Continuing	Continuing	Continuing
Product Development SLAP EA-18G	SS/CPFF	Boeing : St. Louis, MO	0.000	4.730	Sep 2018	4.237	Dec 2018	15.454	Dec 2019	-		15.454	Continuing	Continuing	Continuing
Prior Year Prod Dev cost no longer funded in FYDP	SS/CPFF	Boeing : St. Louis, MO	28.775	0.000		0.000		0.000		-		0.000	0.000	28.775	28.775
		Subtotal	172.128	23.047		18.490		22.740		-		22.740	Continuing	Continuing	N/A

Remarks

Increase in FY 2020 reflects the addition of $1.4 million and the realignment of EA-18G SLAP Product Development tasking.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SLAP Inventory Model	WR	ONR : Arlington, VA	6.525	0.000		0.000		0.000		-		0.000	0.000	6.525	-
SLAP F/A-18 E/F	WR	NAWCAD : Patuxent River, MD	9.224	0.769	Dec 2017	3.005	Dec 2018	0.365	Dec 2019	-		0.365	Continuing	Continuing	Continuing
SLAP F/A-18 E/F	WR	FRC Southwest : San Diego, CA	7.495	0.592	Dec 2017	0.403	Dec 2018	0.214	Dec 2019	-		0.214	Continuing	Continuing	Continuing
SLAP EA-18G	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.700	Dec 2018	0.700	Dec 2019	-		0.700	Continuing	Continuing	Continuing
SLAP EA-18G	WR	FRC Southwest : San Diego, CA	0.000	0.000		0.200	Dec 2018	0.400	Dec 2019	-		0.400	Continuing	Continuing	Continuing
		Subtotal	23.244	1.361		4.308		1.679		-		1.679	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0702207N / *Depot Maintenance (NON-IF)*	Project (Number/Name) 3030 / *FA-18 SLAP*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test & Evaluation F/A-18 E/F	WR	NAWCAD : Patuxent River, MD	1.128	0.157	Dec 2017	0.100	Dec 2018	0.060	Dec 2019	-		0.060	Continuing	Continuing	Continuing
Development Test & Evaluation EA-18G	WR	NAWCAD : Patuxent River, MD	0.000	0.000		0.057	Dec 2018	0.100	Dec 2019	-		0.100	0.000	0.157	-
		Subtotal	1.128	0.157		0.157		0.160		-		0.160	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering and Technical Support SLAP F/A-18 E/F	WR	NAWCAD : Patuxent River, MD	5.954	1.036	Dec 2017	1.055	Dec 2018	1.074	Dec 2019	-		1.074	Continuing	Continuing	Continuing
Travel	Various	NAVAIR : Patuxent River, MD	0.275	0.075	Jun 2018	0.075	Jun 2019	0.075	Jun 2020	-		0.075	Continuing	Continuing	Continuing
Program Management Support (Seaport-CSS)	C/CPFF	WYLE LAB : Patuxent River, MD	2.687	0.050	Dec 2017	0.051	Dec 2018	0.052	Dec 2019	-		0.052	Continuing	Continuing	Continuing
Program Management Support	Various	NAWCAD : Patuxent River, MD	2.797	0.050	Dec 2017	0.051	Dec 2018	0.052	Dec 2019	-		0.052	Continuing	Continuing	Continuing
Program Management Support	C/CPFF	Engility : Patuxent River, MD	0.631	0.156	Dec 2017	0.147	Dec 2018	0.120	Feb 2020	-		0.120	Continuing	Continuing	Continuing
		Subtotal	12.344	1.367		1.379		1.373		-		1.373	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	208.844	25.932		24.334		25.952		-		25.952	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3030 / *FA-18 SLAP*

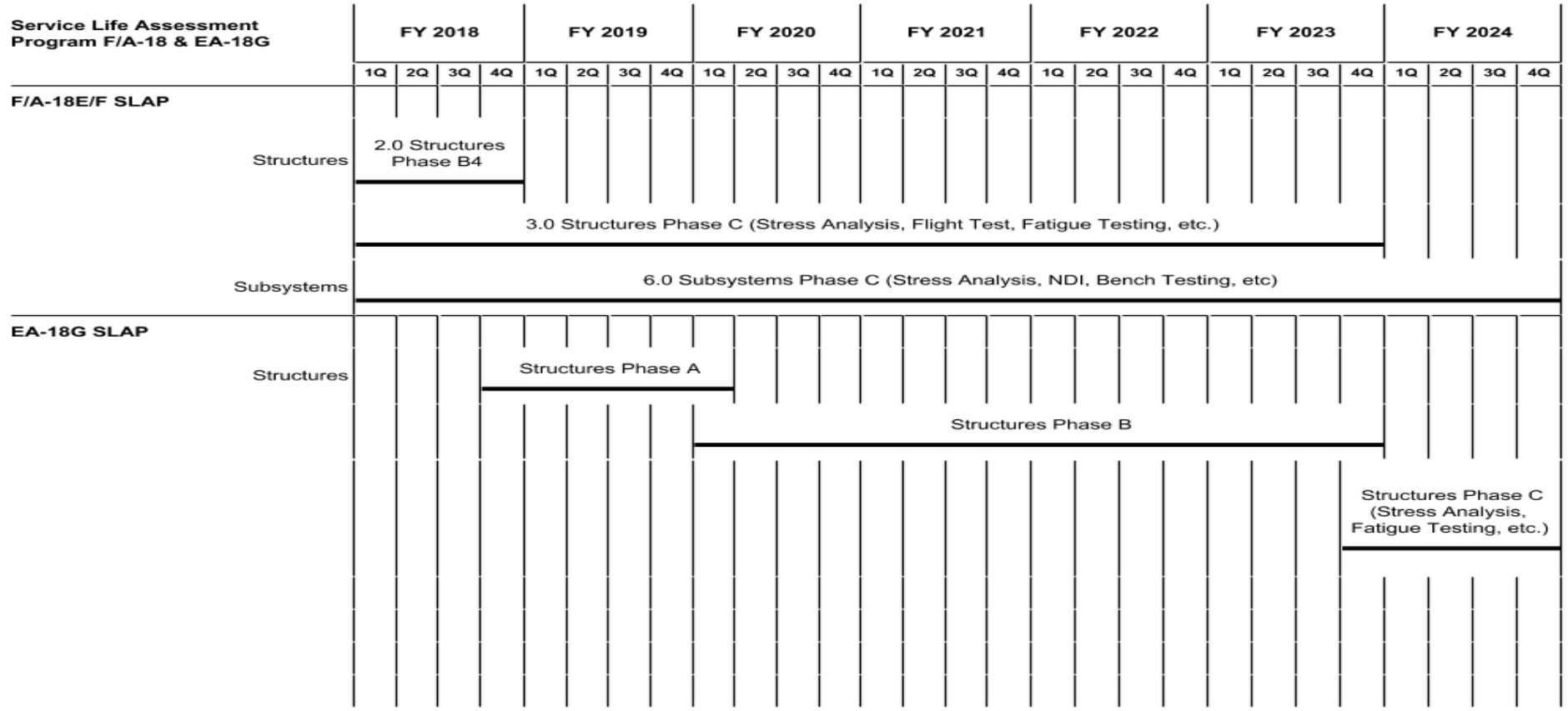

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3030 / *FA-18 SLAP*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Service Life Assessment Program F/A-18 & EA-18G				
F/A-18E/F SLAP: Structures: 2.0 Structures Phase B4	1	2018	4	2018
F/A-18E/F SLAP: Structures: 3.0 Structures Phase C	1	2018	4	2023
F/A-18E/F SLAP: Subsystems: 6.0 Subsystems Phase C	1	2018	4	2024
EA-18G SLAP: Structures: Phase A	4	2018	1	2020
EA-18G SLAP: Structures: Phase B	1	2020	4	2023
EA-18G SLAP: Structures: Phase C	4	2023	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0702207N / *Depot Maintenance (NON-IF)*	Project (Number/Name) 3182 / *T-45 SLAP*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3182: *T-45 SLAP*	26.005	0.000	5.400	6.700	-	6.700	6.800	5.600	0.000	0.000	0.000	50.505
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The T-45 Service Life Assessment Program (SLAP) is assessing the structural and subsystem conditions of the T-45fleet in order to determine what modifications are necessary to extend the aircraft designed life limits to allow it to achieve Chief of Naval Operations (CNO) inventory requirements. The goal of the T-45 SLAP program is to identify critical structures and components that can extend the aircraft designed service life to support IPP and Naval Flight Officer Training Requirements (NTR) until 2035. This initial subsystem assessment, based on the updated fleet aircraft usage spectrum and future predicted training missions of the T-45 aircraft, found 79 dispositions requiring further analysis, teardowns, age explorations, recertification and/or testing . The assessment of the subsystems that make up these 79 dispositions will address all critical subsystems required and their ability to maintain IPP/NTR until 2035, analysis and studies will be conducted to outline improvements, assess manufacturing capabilities, prototype redesign and test of subsystems for trainer aircraft. The current life limits for the T-45 is 14,400 Flight Hours (FH). The T-45 SLAP program of record states the SLAP goals is 21,600 FH. This effort is required to be conducted for these subsystems to ascertain what actions and modifications must be taken to safely operate each system beyond its designed life until the targeted end of service life.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: T-45 SLAP	0.000	5.400	6.700	0.000	6.700
Articles:	-	-	-	-	-
Description: Funding supports development, integration, test, and certification of a Subsystem SLAP to determine modifications necessary to extend service life through 2035.					
FY 2019 Plans: Begin Subsystem SLAP activities including the initial analytical assessment of approximately 50 subsystem parts; component test setup for approximately 20 other parts; and engineering studies with the expectation of extending the T-45 service life to 2035.					
FY 2020 Base Plans: Continue Subsystem SLAP activities and engineering studies as well as the beginning of fatigue, endurance, and cyclic testing of actual parts with the expectation of extending the T-45 service life to 2035.					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3182 / *T-45 SLAP*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The FY2020 funding request was increased by $1.3M to support the beginning of fatigue, endurance, and cyclic testing of actual parts with the expectation of extending the T-45 service life to 2035.					
Accomplishments/Planned Programs Subtotals	0.000	5.400	6.700	0.000	6.700

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• APN/0569: *T-45 Service Life Ext Prg (SLEP) OSIP 022-14*	16.160	26.095	26.530	-	26.530	27.023	29.637	31.042	28.546	132.425	458.278

Remarks

D. Acquisition Strategy

The subsystem SLAP is a sole source contract effort with Boeing, the aircraft prime contractor. SLAP consists of an analysis of the aircraft subsystems (e.g., Global Positioning System Inertial Navigation Assembly or Mission Data Processor). The analysis will facilitate the future development of subsystem modifications and/or redesigns necessary to extend their life until 2035.

E. Performance Metrics

SLAP provides an assessment of aircraft component life as affected by flight maneuver, catapults, arrestments, landings, and obsolescence based on actual usage and identifies the efforts required to extend the aircraft life to SLAP goals (2035). Effort delineates tasking incrementally to include; Tools and modeling necessary to assess usage and life are developed, specific designs which do not meet SLAP goals are identified and analyzed. Retrofit concepts and redesigns for problem areas are developed, followed by the Service Life Extension Program during which the actual retrofits are undertaken.SLAP is followed by the Service Life Extension Program (SLEP) during which the actual retrofit and repairs are performed under OSIP 022-14.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0702207N / *Depot Maintenance (NON-IF)*	Project (Number/Name) 3182 / *T-45 SLAP*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development SLAP T-45	SS/CPFF	Boeing : St. Louis, MO	12.882	0.000		4.505	Feb 2019	5.790	Feb 2020	-		5.790	10.593	33.770	33.770
Product Development SLAP T-45 NACES	C/FFP	Martin Baker : United Kingdom	0.450	0.000		0.000		0.000		-		0.000	0.000	0.450	0.450
		Subtotal	13.332	0.000		4.505		5.790		-		5.790	10.593	34.220	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Technical Support	WR	NAWCAD : Patuxent River, MD	6.270	0.000		0.635	Nov 2018	0.646	Nov 2019	-		0.646	1.283	8.834	-
Engineering Technical Support	WR	NADEP : Jacksonville, FL	2.472	0.000		0.180	Nov 2018	0.183	Nov 2019	-		0.183	0.365	3.200	-
Engineering Technical Support	WR	NAWCAD : Various	1.213	0.000		0.000		0.000		-		0.000	0.000	1.213	-
SLAP Engineering Study	SS/BOA	JHU/APL : Laurel, MD	1.969	0.000		0.000		0.000		-		0.000	0.000	1.969	1.969
SLAP ETS Support	SS/BOA	ASI : Virginia Beach, VA	0.267	0.000		0.000		0.000		-		0.000	0.000	0.267	0.267
		Subtotal	12.191	0.000		0.815		0.829		-		0.829	1.648	15.483	N/A

Management Services ($ in Millions)

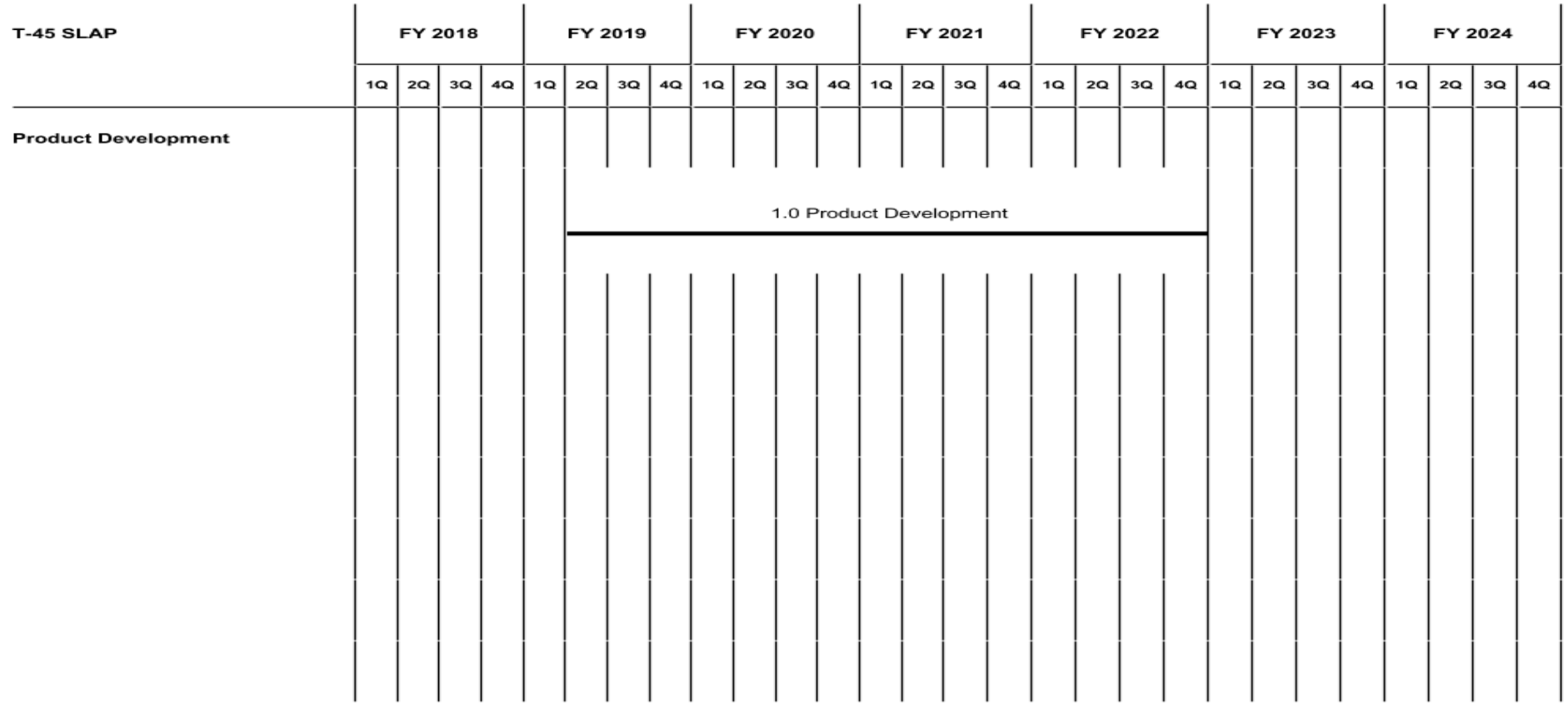
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Various	NAVAIR : Patuxent River, MD	0.482	0.000		0.080	Nov 2018	0.081	Nov 2019	-		0.081	0.159	0.802	-
		Subtotal	0.482	0.000		0.080		0.081		-		0.081	0.159	0.802	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0702207N / *Depot Maintenance (NON-IF)*	Project (Number/Name) 3182 / *T-45 SLAP*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	26.005	0.000		5.400		6.700		-		6.700	12.400	50.505	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3182 / *T-45 SLAP*



2020PB - 0702207N - 3182

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3182 / *T-45 SLAP*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
T-45 SLAP				
Product Development: SLAP T-45C	2	2019	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0702207N / *Depot Maintenance (NON-IF)*	Project (Number/Name) 3384 / *MH-60 SLAP*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3384: *MH-60 SLAP*	0.000	9.531	6.826	5.530	-	5.530	7.083	5.173	5.275	5.382	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

MH-60 SLAP is assessing the primary aircraft structure and subsystem condition of the MH-60S fleet in order to assess the airframe's ability to meet its designed service life of 10,000 hours and to determine what efforts are necessary to extend the aircraft design life limits to allow it to meet Chief of Naval Operations (CNO) operational inventory requirements to bridge to a follow-on program procurement. The highest flight time MH-60S helicopters are expected to exceed the currently assumed design life limit of 10,000 flight hours in 2024, at which time as many as 30 aircraft per year could be downed without a SLAP and Service Life Extension Program (SLEP). The MH-60S has experienced significant structural issues since Initial Operational Capability in August 2002, resulting in downed aircraft and additional inspections for the operational fleet. Similar issues could very well precede the 10,000 flight hour life limit, particularly without the insight provided by a SLAP effort commenced as soon as possible. The MH-60 SLAP is comprised of two distinct assessments: Fatigue Life Assessment (FLA), which will establish the fatigue life of the aircraft and air vehicle systems and Subsystem Life Assessment (SLA), which will determine subsystem components that are critical to safe flight and ground operations and identify safety risk and risk mitigation strategies for critical components. FLA consists of structural investigations of the cockpit beams, main gearbox beams/frames, upper deck, engine mount, lower tub, main landing gear, tail landing gear, cargo hook, transition splice and tie-down fittings/structure, tailcone, tail gearbox, intermediate gearbox, stabilator, manufactured joints/splices, and flight controls support structure. SLA will evaluate engines, rotor brake, hydraulic, flight controls, avionics components and infrastructure, etc., to identify over-and-above inspections, overhaul intervals or replacement schedules to fly beyond the current design limit assumption.

FY 2020 budget request funds the continuation of external loads analysis, fatigue analysis, and development of initial dispositions for safety critical items. This initial analysis, assessment and disposition will be further refined throughout the SLAP effort, augmented with specific system teardown, inspection and test, culminating in a follow-on SLEP, which will design and implement the solutions resulting from the SLAP findings.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MH-60 SLAP	9.531	6.826	5.530	0.000	5.530
Articles:	-	-	-	-	-
Description: The current design life limits do not support United States Navy inventory requirements to bridge to a follow-on program procurement. Funding supports assessing the structural and subsystem condition of the MH-60S fleet in order to determine what modifications are necessary to extend the aircraft designed life limits to bridge that gap.					
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3384 / *MH-60 SLAP*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue to collect aircraft historical regime and usage data for assessment, continue airframe external loads analysis and fatigue analysis, and finish non-destructive tear-down examinations of one (1) aircraft and remaining aircraft components. Continue analytical service life risk assessments of aircraft subsystems and the development of initial dispositions for safety critical items. ***FY 2020 Base Plans:*** Continue to collect aircraft historical regime and usage data for assessment, continue airframe external loads analysis and fatigue analysis. Continue development of initial dispositions for safety critical items. Commence identifying SLEP hardware kit designs. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease of $1.296 million from FY 2019 to FY 2020 is due to the completion of Subsystem Life Assessment.					
Accomplishments/Planned Programs Subtotals	9.531	6.826	5.530	0.000	5.530

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The SLAP program employs a sole source contract with Lockheed Martin; the aircraft prime manufacturer; a sole source contract with General Electric, the engine provider; and government engineering and logistics expertise at Naval Air Station Patuxent River, MD and the H-60 Fleet Support Team at Cherry Point, NC. Analyses from the SLAP efforts will provide the engineering data necessary to develop aircraft structural, component, and subsystem modifications to extend service life flight hour limits in order to avoid flight line inventory shortfalls. The MH-60S SLAP consists of two major engineering efforts: the FLA and the aircraft SLA. These efforts are broken into multiple phases which develop tools and models, assess current aircraft usage, and develop concepts to extend aircraft life to meet Chief of Naval Operations objectives. The program will combine exploitation of aircraft deep look inspections and actual historical fleet usage. Conducting MH-60S SLAP to study the aircraft lifetime will define aircraft service life and is required to determine scope of the future follow-on SLEP.

E. Performance Metrics

The MH-60 SLAP FLA provides an assessment of aircraft structure fatigue life as affected by flight maneuver and Ground-Air-Ground cycles, based on Government furnished usage spectra and identifies the efforts required to extend the aircraft life to SLAP goals. During the FLA External Loads Analysis (FY 2018-2019), external loads for all fatigue conditions are identified from the three usage spectra. During the FLA (FY 2018-FY 2022), the fatigue assessment results and calculated fatigue

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
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lives are documented and areas for future improvements to extend the aircraft service life are identified. During the FLA Structural Analysis (FY 2020-FY 2022), static fail-safety analyses of specific airframe sites are conducted to substantiate continued safe flight and identify areas for future service life extensions. Subsystems Phase A utilizes an interdisciplinary team within the USN tasked to develop a methodology for service life assessment of safety critical subsystems. The resulting methodology will be based on a risk-focused approach that evaluates subsystems for potential safety critical failure modes, analyzes the associated hardware for age-related risk factors, and develops data-gathering or risk reduction dispositions. Subsystem SLAP Phase B is initiated concurrently with the FLA. During Subsystems SLAP Phase B (FY 2018-FY 2019), analytical service life risk assessments of aircraft subsystems are conducted and initial dispositions for safety-critical items are developed. During Subsystems SLAP Phase C (FY 2020-FY 2023), dispositions of Phase B are executed by performing component tests, aircraft inspections, and assembly teardowns. Additionally, SLAP assessments are continued on components needing further investigation. Subsystem SLAP Phase C is defined as the execution of the disposition decision resulting from Phase B efforts and will include the performance of component tests, aircraft inspections, component level fatigue analysis, and assembly teardowns. During this Phase, Phase B dispositions will be refined for safety critical components based on new data.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Fatigue Life Assessment MH-60S	SS/CPFF	Lockheed Martin : Owego, NY	0.000	2.612	Aug 2018	2.700	Dec 2018	3.000	Dec 2019	-		3.000	1.388	9.700	9.700
Subsystem Life Assessment MH-60S	Various	Various : Various	0.000	1.910	Jun 2018	1.700	Jun 2019	0.000		-		0.000	0.000	3.610	3.610
		Subtotal	0.000	4.522		4.400		3.000		-		3.000	1.388	13.310	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SLAP MH-60S	WR	NAWCAD : Patuxent River, MD	0.000	2.578	Oct 2017	1.206	Nov 2018	1.320	Nov 2019	-		1.320	Continuing	Continuing	Continuing
SLAP MH-60S	WR	Various : Various	0.000	1.445	Oct 2017	0.750	Nov 2018	0.750	Nov 2019	-		0.750	Continuing	Continuing	Continuing
Eng & Tech Srvc (Non FFRDC)	Various	Various : Various	0.000	0.168	May 2018	0.172	May 2019	0.171	May 2020	-		0.171	0.000	0.511	Continuing
		Subtotal	0.000	4.191		2.128		2.241		-		2.241	Continuing	Continuing	N/A

Remarks

FY 2020 NAWCAD increase is due to HW/Subsystems Dispositions.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technical Support SLAP MH-60S	WR	NAWCAD : Patuxent River, MD	0.000	0.220	Oct 2017	0.224	Nov 2018	0.228	Nov 2019	-		0.228	Continuing	Continuing	Continuing
Mgmt Supt Services (Non FFRDC)	Various	Various : Various	0.000	0.580	May 2018	0.056	May 2019	0.043	May 2020	-		0.043	0.000	0.679	Continuing
Travel	Various	NAVAIR : Patuxent River, MD	0.000	0.018	Oct 2017	0.018	Oct 2018	0.018	Oct 2019	-		0.018	0.000	0.054	-
		Subtotal	0.000	0.818		0.298		0.289		-		0.289	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
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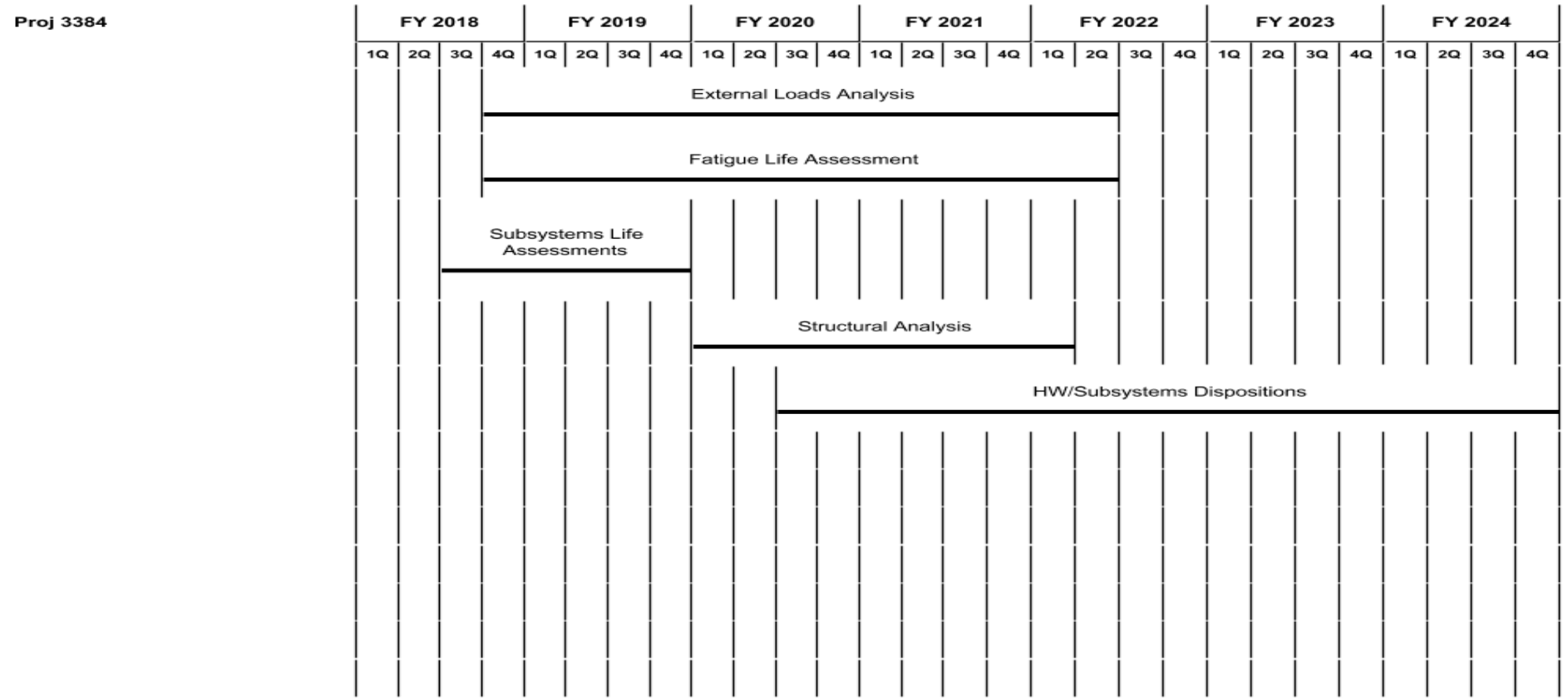
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	9.531		6.826		5.530		-		5.530	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3384 / *MH-60 SLAP*



2020DON - 0702207N - 3384

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 3384 / *MH-60 SLAP*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3384				
External Loads Analysis	4	2018	2	2022
Fatigue Life Assessment	4	2018	2	2022
Subsystems Life Assessments	3	2018	4	2019
Structural Analysis	1	2020	1	2022
HW/Subsystems Dispositions	3	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0702207N / *Depot Maintenance (NON-IF)*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	10.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MH-60 Service Life Analysis Program (SLAP) is assessing the primary aircraft structure and subsystem condition of the MH-60S fleet in order to assess the airframe's ability to meet its designed service life of 10,000 hours and to determine what efforts are necessary to extend the aircraft design life limits to allow it to meet Chief of Naval Operations operational inventory requirements through FY 2035. Without SLAP, aircraft are retired from the USN inventory when design service life limits are reached directly impacting fleet anti-surface warfare, mine countermeasures, search and rescue, and vertical replenishment operational capabilities. FY 2019 Congressional Add funds analysis and development of the 401D engine; the procurement of MH-60 alignment, tail cone, and pylon fixtures to support SLAP analysis, development of engineering technical data, drawings/models and associated lists from the Original Equipment Manufacturer (OEM) in support of SLAP deep look inspections.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: MH-60 SLAP	0.000	10.000
FY 2018 Accomplishments: N/A		
FY 2019 Plans: Continue the assessment of the 401D engines program and began associated software assessment. Procure alignment, tail cone and pylon refurbishment fixtures. Provide Original Equipment Manufacturer technical support of the SLAP deep look inspections.		
Congressional Adds Subtotals	0.000	10.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The SLAP procurement employs a sole source contract with Lockheed Martin the aircraft prime manufacturer; a sole source contract with General Electric, the engine manufacturer; STADCO, the fixture manufacturer; and Government engineering and logistic expertise at Naval Air Station (NAS) Patuxent River, MD and the Government H-60 Fleet Support Team at Marine Corps Air Station (MCAS) Cherry Point, NC.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 9999 / *Congressional Adds*

E. Performance Metrics

Award STADCO a contract (FY 2019) and take delivery of MH-60 alignment, tail cone and pylon refurbishment fixtures (FY 2020). Develop the software and Engineering Change Proposal required for the T-700-401D engine (FY 2019 through FY 2021). Support aircraft deep look inspections and scope definition of a future follow-on Service Life Extension Program (SLEP) (FY 2019 through FY 2020).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 9999 / *Congressional Adds*

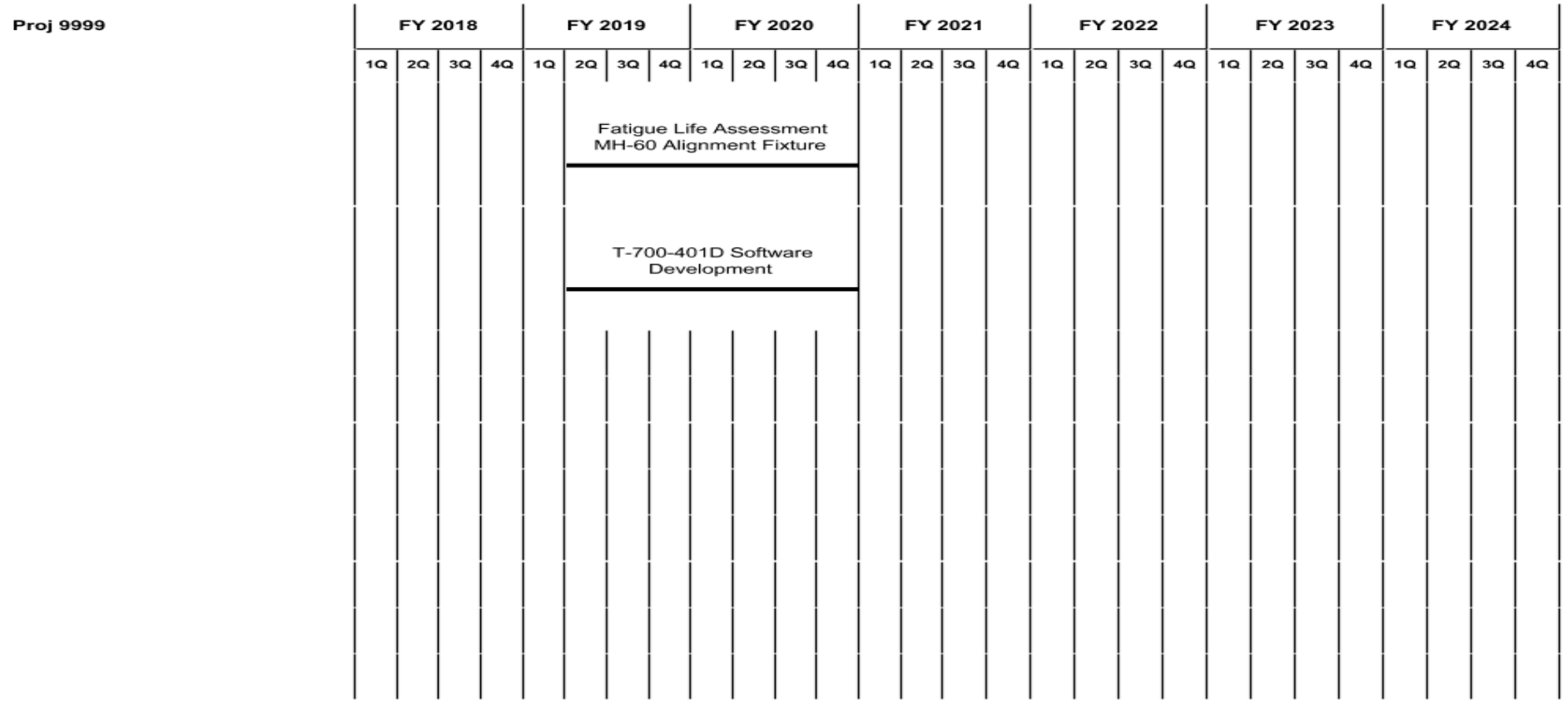
Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Fatigue Life Assessment MH-60 Alignment Fixture	SS/FFP	STADCO : Los Angeles, CA	0.000	0.000		3.883	Mar 2019	0.000		-		0.000	0.000	3.883	3.883
Reliability Centered Maintenance	SS/CPFF	Andromeda Systems, Inc. : Virgina Beach, VA	0.000	0.000		0.500	Jun 2019	0.000		-		0.000	0.000	0.500	0.500
T-700-401D Software	SS/CPFF	GE : Lynn, MA	0.000	0.000		3.517	Mar 2019	0.000		-		0.000	0.000	3.517	3.517
SLAP Engineering & Logistics Support	SS/CPFF	Lockheed Martin : Owego, NY	0.000	0.000		2.100	Feb 2019	0.000		-		0.000	0.000	2.100	2.100
		Subtotal	0.000	0.000		10.000		0.000		-		0.000	0.000	10.000	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		10.000		0.000		-		0.000	0.000	10.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 9999 / *Congressional Adds*



2020PB - 0702207N - 9999

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0702207N / *Depot Maintenance (NON-IF)*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Fatigue Life Assessment MH-60 Alignment Fixture	2	2019	4	2020
T-700-401D Software Development	2	2019	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0708730N *I Maritime Tech (MARITECH)*

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	24.591	4.621	27.284	6.779	-	6.779	7.512	7.664	7.823	7.980	Continuing	Continuing
2466: *NSRP ASE*	24.591	4.621	4.319	3.752	-	3.752	4.421	4.507	4.602	4.694	Continuing	Continuing
3435: *Advanced Shipyard Technology*	0.000	0.000	2.965	3.027	-	3.027	3.091	3.157	3.221	3.286	Continuing	Continuing
9999: *Congressional Adds*	0.000	0.000	20.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.000

A. Mission Description and Budget Item Justification

The National Shipbuilding Research Program (NSRP) is an industry and enterprise wide research collaboration that seeks to reduce the Navy's shipbuilding and repair cost. The resulting technologies implemented in NSRP-ASE member shipyards, benefit both the shipyard and the US Navy.

The Advanced Shipyard Technology (AST) seeks to improve the productivity, quality, and reduce costs of maintenance performed by the Naval public shipyards. The resulting technologies implemented by this program benefit both the naval shipyard and the US Navy.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	4.808	7.284	6.779	-	6.779
Current President's Budget	4.621	27.284	6.779	-	6.779
Total Adjustments	-0.187	20.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	20.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.187	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *Advanced Additive Technologies for Sustainment of Navy Assets*	0.000	20.000
Congressional Add Subtotals for Project: 9999	0.000	20.000
Congressional Add Totals for all Projects	0.000	20.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0708730N *I Maritime Tech (MARITECH)*

Change Summary Explanation

The decrease from FY 2019 to FY 2020 is result of programmatic changes for efficiency and effectiveness.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0708730N / *Maritime Tech (MARITECH)*				Project (Number/Name) 2466 / *NSRP ASE*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
2466: *NSRP ASE*	24.591	4.621	4.319	3.752	-	3.752	4.421	4.507	4.602	4.694	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

NSRP ASE is a collaboration of U.S. shipyards working with the Navy customer to reduce the cost of building and repairing naval ships and improving shipbuilding industry productivity through advanced technology and processes. NSRP ASE is an innovative and proven approach to public/private cooperation to manage cost-shared R&D based on a national consensus Strategic Investment Plan. The Plan targets potential industry-wide technology and process solutions which are vetted by industry experts and builds upon the progress made over the previous years. The collaboration's organizational structure promotes teaming of industry, government and academia to achieve the continuous product and process improvements necessary for improved Navy ship affordability. Solutions include both leverage of best commercial practices and creation of industry-wide initiatives with aggressive technology transfer to, and buy-in by, multiple U.S. shipyards. Navy PEOs (Ships, Subs and Carriers) and NAVSEA are directly involved in NSRP. The Plan calls for matching government and industry investments over several years.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Title: Technology Development Projects	4.621	4.319	3.752	0.000	3.752
Articles:	-	-	-	-	-
Description: The NSRP is an ongoing Research and Development program. This program awards small research projects and large research projects to (1) Improve Quality; (2) Reduce Total Ownership Costs; and, (3) Increase Energy Efficiency. These research projects have been known to produce technological advances in shipbuilding that once implemented have resulted in savings for the Navy.					
FY 2019 Plans: (1) Complete technology development projects in the four major initiative areas (Ship Design and Material Technologies, Ship Production Technologies, Business Process and Information Systems, and Infrastructure and Support (Regulatory Compliance, Technology Transfer and Workforce Development)) that will be competitively selected by industry subject matter experts and Navy stakeholders during GFY19, targeting the following priorities in Naval shipbuilding and repair: (1) Improving Quality; (2) Reduction of Total Ownership Costs; and, (3) Increasing Energy Efficiency. It is anticipated that projects selected will continue to be focused in the following areas: - Promotion of Modular Construction - Reduction of Re-work - Improving Production Engineering - Improving Specifications and Standards					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 2466 / *NSRP ASE*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Improving Manufacturing Processes - Improving Production Planning - Data Exchange - Improving Safety & Health / Reducing Environmental Impacts - Education and Training - Total Ownership Cost (2) Continue technology transfer among the Navy, shipbuilding industry, academia, equipment and material suppliers and the R&D community					
FY 2020 Base Plans: (1) Complete technology development projects in the four major initiative areas (Ship Design and Material Technologies, Ship Production Technologies, Business Process and Information Systems, and Infrastructure and Support (Regulatory Compliance, Technology Transfer and Workforce Development)) that will be competitively selected by industry subject matter experts and Navy stakeholders during GFY20, targeting the following priorities in Naval shipbuilding and repair: (1) Improving Quality; (2) Reduction of Total Ownership Costs; and, (3) Increasing Energy Efficiency. It is anticipated that projects selected will continue to be focused in the following areas: - Promotion of Modular Construction - Reduction of Re-work - Improving Production Engineering - Improving Specifications and Standards - Improving Manufacturing Processes - Improving Production Planning - Data Exchange - Improving Safety & Health / Reducing Environmental Impacts - Education and Training - Total Ownership Cost (2) Continue technology transfer among the Navy, shipbuilding industry, academia, equipment and material suppliers and the R&D community					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 2466 / *NSRP ASE*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The decrease from FY 2019 to FY 2020 is result of programmatic changes for efficiency and effectiveness.					
Accomplishments/Planned Programs Subtotals	4.621	4.319	3.752	0.000	3.752

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

R&D projects have been solicited and awarded by an industry collaboration represented by the Executive Control Board (ECB) of the National Shipbuilding Research Program (NSRP). The Navy has entered into an agreement with the industry collaboration using "other transaction" authority pursuant to 10 U.S.C. 2371.

E. Performance Metrics

Quarterly reports and reviews

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0708730N / *Maritime Tech (MARITECH)*	Project (Number/Name) 2466 / *NSRP ASE*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Development	Various	ECB NSRP : Not Specified	23.720	4.621	Dec 2017	4.319	Dec 2018	3.752	Dec 2019	-		3.752	Continuing	Continuing	Continuing
		Subtotal	23.720	4.621		4.319		3.752		-		3.752	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Gov't Support Services	WR	NSWCCD : Not Specified	0.650	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Contractor Support Services	Various	Various : Not Specified	0.221	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	0.871	0.000		0.000		0.000		-		0.000	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	24.591	4.621		4.319		3.752		-		3.752	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 2466 / *NSRP ASE*

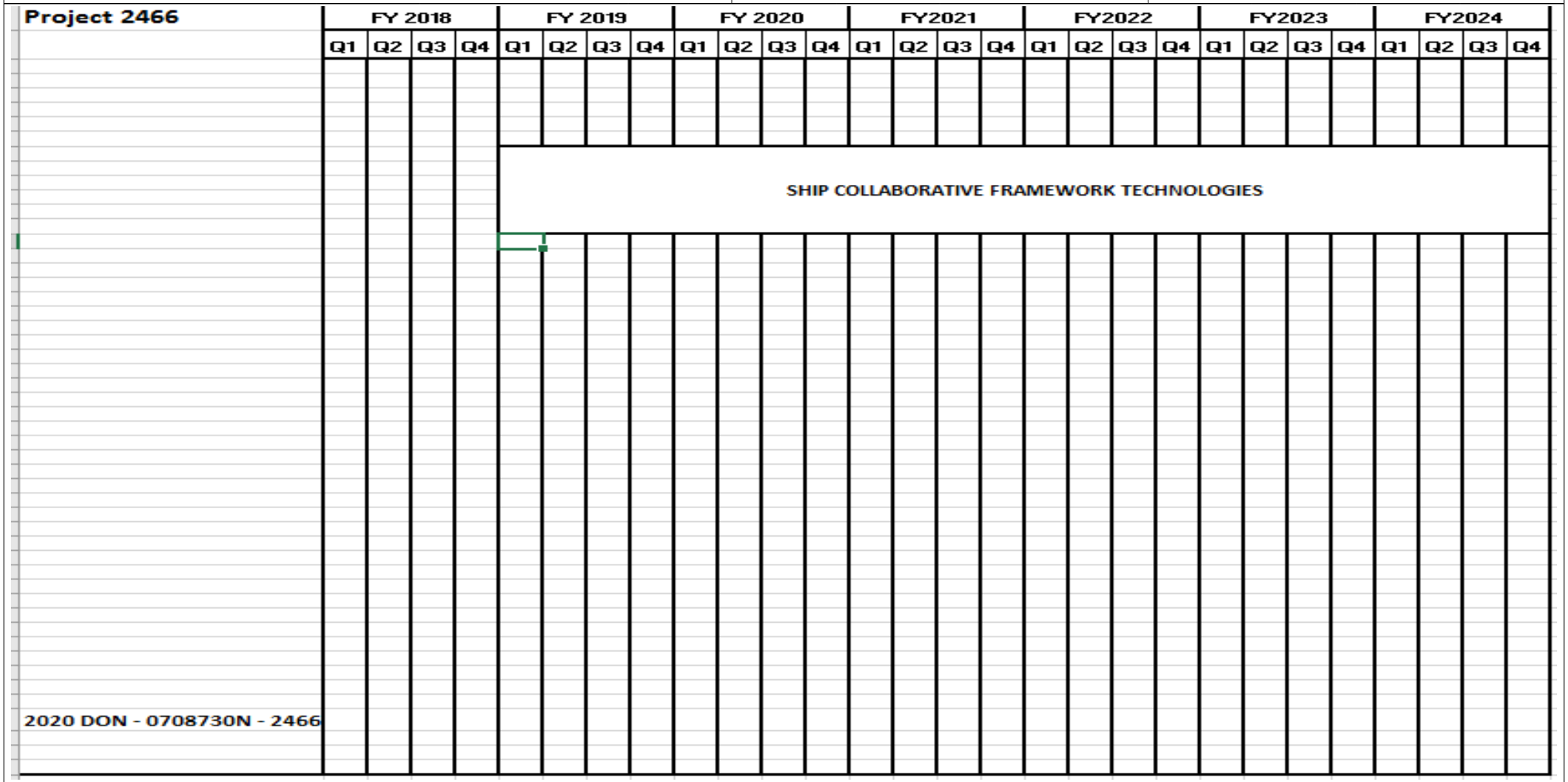

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 2466 / *NSRP ASE*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2466				
Ship Collaborative Framework Technologies	1	2019	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0708730N / *Maritime Tech (MARITECH)*	Project (Number/Name) 3435 / *Advanced Shipyard Technology*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3435: *Advanced Shipyard Technology*	0.000	0.000	2.965	3.027	-	3.027	3.091	3.157	3.221	3.286	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Shipyard Technology (AST) develops, matures, and transitions technology (production processes, human augmentation, business process, IT, tooling, etc.), into the naval shipyards. Advanced Shipyard Technology funding will facilitate collaboration between government (Naval Sea Systems Command (NAVSEA), the public naval shipyards, Navy customers, Naval Warfare Centers, and others), academia, and industry. AST is an innovative approach to leverage public/private cooperation and target technology and process solutions that build on progress made over the previous years. Funding ensures widespread adoption of innovative improvements, enhancing proficiency and productivity of the public naval shipyard workforce to achieve the continuous product and process improvements necessary for improved Navy ship repair costs, and an overall reduction in availability duration.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Technology Transfer	0.000	2.965	3.027	0.000	3.027
Articles:	-	-	-	-	-
FY 2019 Plans: Complete and accelerate technology transfer projects in the four major initiative areas (Predictive Planning, Proficient Workforce Development, Infrastructure-IT and Support, and Shipyard Execution) to deliver ships to the warfighter on time at the best cost. These funds enable "See, Solve, and Sustain" naval shipyard innovations through targeting of projects that deliver improvements in Critical Path Work, and Reduction of Total Ownership Costs (Improve Quality, Safety, and Throughput). Specific projects will be competitively selected by Navy subject matter experts during FY18, targeting the following capabilities in Naval Shipyards: a. Implement accelerated technology transfer and best practices on Shipyard Maintenance among industry, academia, and other DOD Services (e.g. automation, artificial intelligence, virtual reality, augmented reality, and geolocation). b. Accelerate technical approvals on new methods, such as laser ablation and cold spray disruptive technologies. c. Establish and Sustain Naval Shipyard Laboratory Operations, Partnerships, and Results.					
FY 2020 Base Plans: Complete technology development projects in the six major initiative areas (Surface Restoration, Additive Manufacturing and Repair, Expeditionary Maintenance, Automation and Robotics, Digital Shipyard, and					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 3435 / *Advanced Shipyard Technology*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Infrastructure) that will be competitively selected by sustainment and technology subject matter experts and Navy stakeholders. The following are priorities in Naval sustainment and repair: (1) Reduce Critical Path; (2) Reduce Cycle Times; (3) Reduce Life cycle Costs, (4) Increase throughput and, (5) Improve workforce safety and efficacy. It is anticipated that projects selected will continue to be focused in the following areas: - Modernizing Industrial Processes - Improving Material Availability - Increasing Workforce Capacity - New repair technologies - Reducing Re-work - Improving Worker Efficiency - Improving Scheduling and Planning - Improving Safety & Health / Reducing Environmental Impacts - Education and Training - Total Ownership Cost (2) Leverage technology transfer opportunities ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase from FY 2019 to FY 2020 is due to normal inflation factors.					
Accomplishments/Planned Programs Subtotals	0.000	2.965	3.027	0.000	3.027

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Technologies will be developed and fielded based on their level of maturity and measure of benefit to the public naval shipyards.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 3435 / *Advanced Shipyard Technology*

E. Performance Metrics

Quarterly reports and reviews.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0708730N / *Maritime Tech (MARITECH)*	Project (Number/Name) 3435 / *Advanced Shipyard Technology*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Development	Various	Various : Locations	0.000	0.000		2.965	Dec 2018	3.027	Dec 2019	-		3.027	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		2.965		3.027		-		3.027	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		2.965		3.027		-		3.027	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 3435 / *Advanced Shipyard Technology*

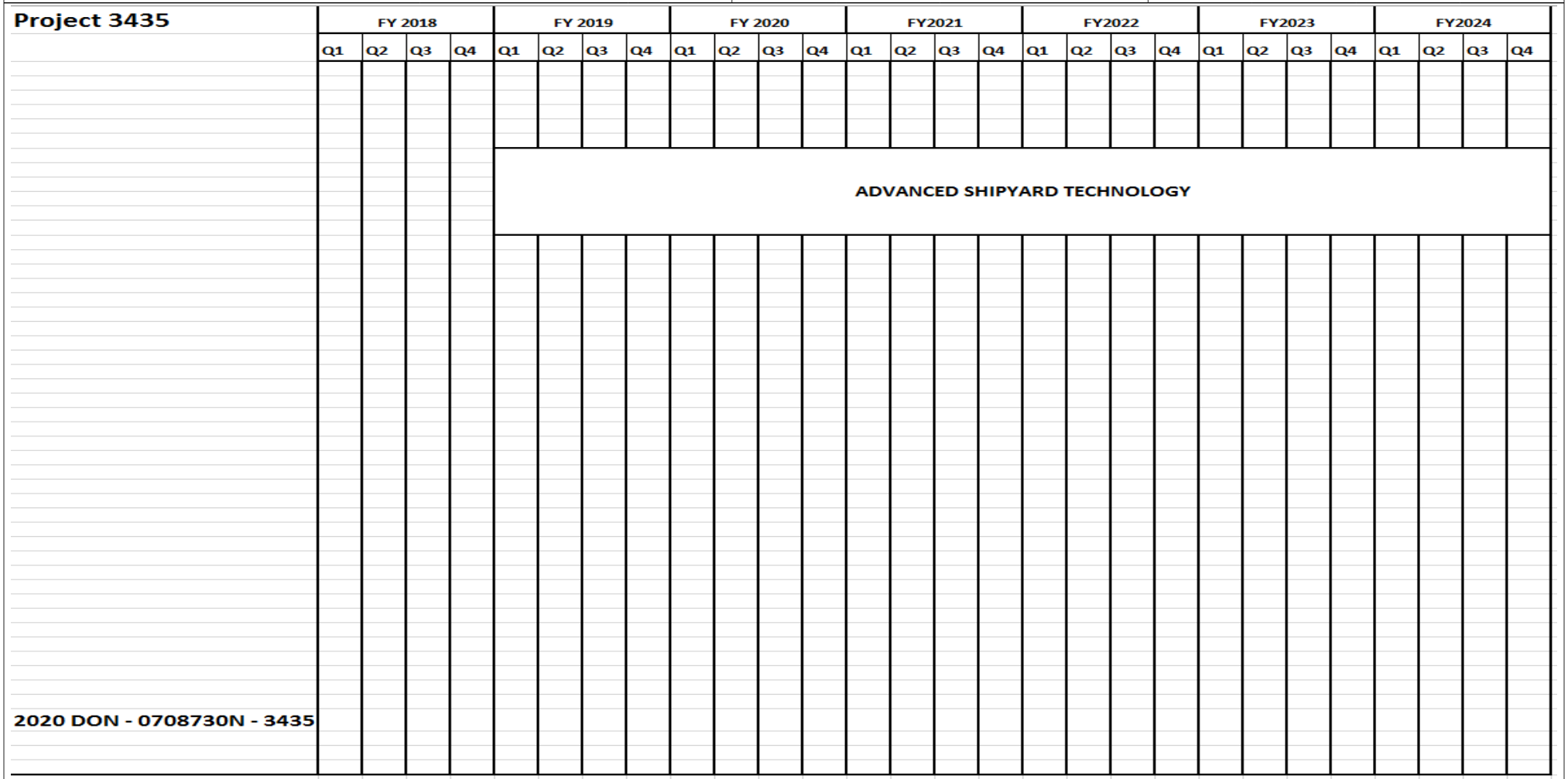

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 3435 / *Advanced Shipyard Technology*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3435				
Advanced Shipyard Technologies	1	2019	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0708730N / *Maritime Tech (MARITECH)*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	20.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Shipyard Technology (AST) develops, matures, and transitions technology (production processes, human augmentation, business process, IT, tooling, etc.), into the naval shipyards. Advanced Shipyard Technology funding will facilitate collaboration between government (Naval Sea Systems Command (NAVSEA), the public naval shipyards, Navy customers, Naval Warfare Centers, and others), academia, and industry. AST is an innovative approach to leverage public/private cooperation and target technology and process solutions that build on progress made over the previous years. Funding ensures widespread adoption of innovative improvements, enhancing proficiency and productivity of the public naval shipyard workforce to achieve the continuous product and process improvements necessary for improved Navy ship repair costs, and an overall reduction in availability duration. The congressional add will accelerate the delivery of technical capabilities to support the warfighter and to advance technologies that will modernize and sustain military systems in an efficient, cost-effective manner. The additional funding will support the development of advanced additive technologies for sustainment of navy assets including Cold Spray.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: Advanced Additive Technologies for Sustainment of Navy Assets	0.000	20.000
FY 2018 Accomplishments: N/A		
FY 2019 Plans: N/A		
Congressional Adds Subtotals	0.000	20.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Technologies will be developed and fielded based on their level of maturity and measure of benefit to the public naval shipyards.

E. Performance Metrics

Quarterly reports and reviews.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0708730N / *Maritime Tech (MARITECH)*	Project (Number/Name) 9999 / *Congressional Adds*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Development	MIPR	Penn State U : University Park, PA	0.000	0.000		2.000	Jan 2019	0.000		-		0.000	0.000	2.000	-
Technology Development	WR	PNSY : Kittery , Maine	0.000	0.000		1.000	Jan 2019	0.000		-		0.000	0.000	1.000	-
Technology Development	WR	NSWCPD : Philladelphia, PA	0.000	0.000		0.065	Jan 2019	0.000		-		0.000	0.000	0.065	-
Technology Development	WR	NSWCPC : Panama City, FL	0.000	0.000		0.900	Jan 2019	0.000		-		0.000	0.000	0.900	-
Technology Development	MIPR	NAVAIR : San Diego, CA	0.000	0.000		5.000	Mar 2019	0.000		-		0.000	0.000	5.000	-
Technology Development	MIPR	ARMY ARL : Adelphi, MD	0.000	0.000		8.000	Jul 2019	0.000		-		0.000	0.000	8.000	-
Technology Development	MIPR	MANTECH : Washignton DC	0.000	0.000		1.000	Aug 2019	0.000		-		0.000	0.000	1.000	-
Technology Development	MIPR	CTMA : Washington DC	0.000	0.000		0.300	Sep 2019	0.000		-		0.000	0.000	0.300	-
Technology Development	WR	NUWC Keyport : Keyport, WA	0.000	0.000		0.750	Sep 2019	0.000		-		0.000	0.000	0.750	-
		Subtotal	0.000	0.000		19.015		0.000		-		0.000	0.000	19.015	N/A

Remarks

Funds provided to support the development of Cold Spray and Additive Manufacturing Technologies.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services	WR	NUWC Keyport : Keyport, WA	0.000	0.000		0.985	Jun 2019	0.000		-		0.000	0.000	0.985	-
		Subtotal	0.000	0.000		0.985		0.000		-		0.000	0.000	0.985	N/A

Remarks

Cost-Reimbursable services for project management and technical insertion to public shipyards

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0708730N / *Maritime Tech (MARITECH)*	Project (Number/Name) 9999 / *Congressional Adds*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		20.000		0.000		-		0.000	0.000	20.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 9999 / *Congressional Adds*

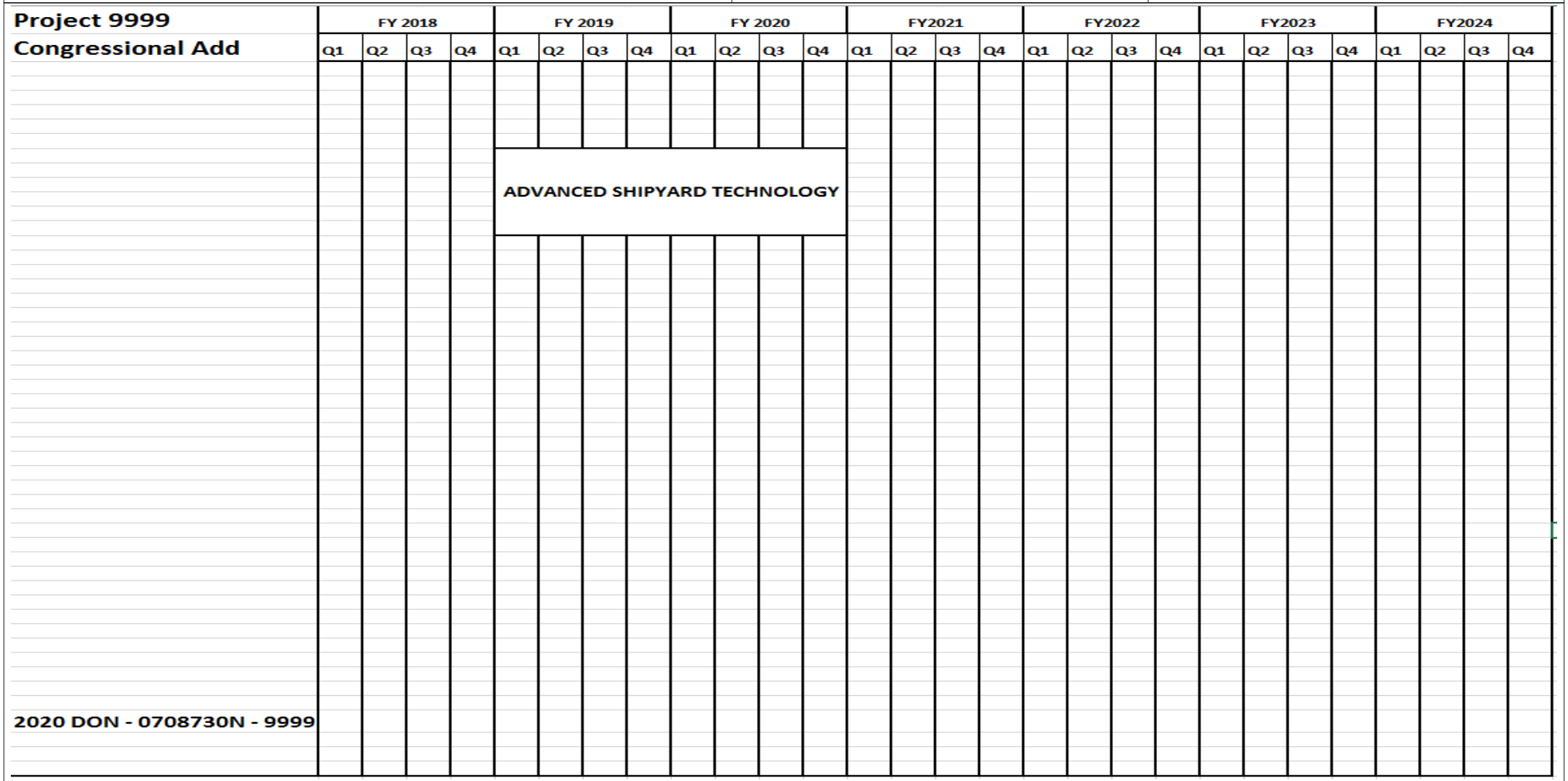

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0708730N / *Maritime Tech (MARITECH)*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
ADVANCED SHIPYARD TECHNOLOGY	1	2019	1	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 1203109N *I (U)Satellite Communications (SPACE)*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	40.330	34.174	15.868	-	15.868	23.086	22.088	17.376	16.454	35.416	204.792
0728: *EHF SATCOM Terminals*	0.000	21.830	17.729	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	39.559
2472: *Mobile User Objective Sys (MUOS)*	0.000	13.556	15.530	15.868	-	15.868	23.086	22.088	17.376	16.454	35.416	159.374
3398: *Enterprise SATCOM Gateway Modems (ESGMs)*	0.000	0.116	0.915	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.031
9999: *Congressional Adds*	0.000	4.828	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.828
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 290, 345												

Note

Navy Multiband Terminal (NMT) Program has been realigned from PE 1203109N to PE 0303109N (U)SATELLITE COMMUNICATIONS (SPACE) starting in FY20.

A. Mission Description and Budget Item Justification

The Navy Multiband Terminal (NMT) Program is the required Navy component to the Advanced Extremely High Frequency (AEHF) program for enhancing protected and survivable satellite communications to Naval forces. The NMT system provides an increase in single service capability from 1.5 Megabits per second (Mbps) to 8 Mbps, increases the number of coverage areas and retains Anti-Jam/Low Probability of Intercept (AJ/LPI) protection characteristics. It is compatible with legacy Navy Low Data Rate/Medium Data Rate (LDR/MDR) terminals and will sustain the Military Satellite Communications (MILSATCOM) architecture by providing connectivity across the spectrum of mission areas, to include land, air and naval warfare, special operations, strategic nuclear operations, strategic defense, theater missile defense, and space operations and intelligence in support of Resilient Command and Control (RC2) initiatives. The NMT system replenishes and improves on Navy terminal capabilities of the Military Strategic, Tactical & Relay System (MILSTAR), Defense Satellite Communications System (DSCS), Wideband Global Satellite (WGS) and Global Broadcast Service (GBS). The new system equips the warfighters with the assured, jam resistant, secure communications as described in the joint AEHF satellite communications system and WGS Operational Requirements Documents (ORD).

The Navy GBS Program is the Navy component of the Joint Military Satellite Communications (MILSATCOM) ACAT IC program that delivers the continuous flow of high-speed, high-volume communication and information flow for deploying, deployed, on the move, and garrisoned forces. The Joint GBS system supports the Navy Strategic Plan and equips warfighters with Resilient Command and Control (RC2) communications. The Enterprise SATCOM Gateway Modem (ESGM) is the Department of Defense (DoD) Chief Information Officer directed solution to satisfy the Transmission Security (TRANSEC) requirement in place of the Joint Internet. Testing and fielding of the ESGM is a joint venture, operationally directed by the Defense Information Systems Agency (DISA) and the United States Air Force (USAF) as the lead service. GBS augments and interfaces with other communications systems, provides relief to overburdened communications systems already in place, and provides information to previously unsupported users. GBS provides bandwidth five times any other system, up to 45 Mbps of forward link data (shore to ship) per WGS satellite transponder.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 1203109N *I (U)Satellite Communications (SPACE)*

The Mobile User Objective System (MUOS) program provides for the development of the next generation Department of Defense (DoD) advanced narrowband communications satellite constellation. MUOS is the only Ultra High Frequency (UHF) satellite system replacing the aging UHF Follow-on (UFO) system, which is currently beyond its design life. MUOS provides legacy UHF satellite communications as well as a Wideband Code Division Multiple Access (WCDMA) capability which significantly increases performance and capacity critical to support Combatant Command priorities.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	37.836	39.174	47.333	-	47.333
Current President's Budget	40.330	34.174	15.868	-	15.868
Total Adjustments	2.494	-5.000	-31.465	-	-31.465
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-5.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.111	0.000			
• Program Adjustments	-0.001	0.000	-31.288	-	-31.288
• Rate/Misc Adjustments	0.000	0.000	-0.177	-	-0.177
• Congressional Directed Reductions Adjustments	-1.394	-	-	-	-
• Congressional Add Adjustments	5.000	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 9999: *Congressional Adds*		
Congressional Add: *NMT Development*	4.828	0.000
Congressional Add Subtotals for Project: 9999	4.828	0.000
Congressional Add Totals for all Projects	4.828	0.000

Change Summary Explanation

Navy Multiband Terminal (NMT) Program (Project 0728) has been realigned from PE 1203109N to PE 0303109N (U)SATELLITE COMMUNICATIONS (SPACE) starting in FY20.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 1203109N *I (U)Satellite Communications (SPACE)*

The MUOS (Project 2472) increase in FY20 funds End to End (E2E) MUOS usability enhancements. This is offset by reduction of $1.691M to account for the availability of prior year balances.

The Congressional Add in FY18 provides $5M (Project 0728) for the development, test and evaluation of enhanced capabilities for the Navy Multiband Terminal (NMT) by furthering Science & Technology (S&T) research and transition activities associated with resilient communications capabilities.

Schedule:
EHF SATCOM Terminals (Project 0728) - No change
MUOS (Project 2472) Enterprise Agile Deployment (EAD) 8 slipped one quarter due to technical issues identified and corrected.

Technical:
EHF SATCOM Terminals (Project 0728): No change

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*				Project (Number/Name) 0728 / *EHF SATCOM Terminals*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
0728: *EHF SATCOM Terminals*	0.000	21.830	17.729	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	39.559
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 290

Note

Navy Multiband Terminal (NMT) Program has been realigned from PE 1203109N to PE 0303109N starting in FY20.

A. Mission Description and Budget Item Justification

The Navy Multiband Terminal (NMT) Program is the required Navy component to the Advanced Extremely High Frequency (AEHF) Program for enhancing protected and survivable satellite communications to Naval forces. Although development of the NMT terminal is complete, software and hardware upgrade development is ongoing to provide enhanced capabilities to the fleet. The NMT system provides an increase in single service capability from 1.5 Megabits per second (Mbps) to 8 Mbps, increases the number of coverage areas, and retains Anti-Jam/Low Probability of Intercept (AJ/LPI) protection characteristics. It is compatible with legacy Navy Low Data Rate/Medium Data Rate (LDR/MDR) terminals and will sustain the Military Satellite Communications (MILSATCOM) architecture by providing connectivity across the spectrum of mission areas, to include land, air and naval warfare, special operations, strategic defense, theater missile defense, and space operations and intelligence. The NMT system replenishes and improves on Navy Military Strategic, Tactical & Relay System (MILSTAR), Defense Satellite Communications System (DSCS), Wideband Global Satellite (WGS), and Global Broadcast Service (GBS) terminal capabilities. The new system equips the warfighters with assured, jam resistant, secure communications as described in both the joint AEHF Satellite Communications System and the WGS Operational Requirement Documents (ORD). Mission requirements specific to Navy operations, including threat levels and scenarios, are contained in the ORD. The NMT provides multiband Satellite Communications (SATCOM) capability for ship, submarine, and protected MILSATCOM for shore sites.

The Wideband Anti-Jam Modem System (WAMS) is a Navy technology upgrade that enhances communication capability of shipboard and submarine NMTs by providing wideband Anti-Jam (AJ) Satellite Communication throughput over Wideband Global SATCOM (WGS). WAMS is a major contributor in supporting the National Defense Strategy by investing in resilience to provide assured communications capabilities. WAMS enables space segment Anti Jam (AJ) diversity (EHF/AEHF and WGS), thus enabling NMT ships and submarines equipped with the modem to operate in wideband links closer to threat jammers. The United States USAF (USAF) Protected Tactical Enterprise Service (PTES) program will provide the ground hub component of the WAMS communication system. This PTES joint hub will serve as a DoD enterprise service ground solution for the use of the Protected Tactical Waveform (PTW) of SATCOM communications and introduces a Network Operations Without Shore (NOWS) capability. The NOWS capability will use the Direct Sequence Spread Spectrum (DSSS) waveform that provides uninterrupted communication in case of loss of shore hub connectivity. PTW is a Frequency Hopped Spread Spectrum (FHSS) waveform that provides high data rates in a benign environment and anti-jam protection to meet contested data rate requirements. High data rate anti-jam capability is enabled via the Protected Tactical Waveform (PTW) and low data rate anti-jam capability is provided via the Direct Sequence Spread Spectrum (DSSS) waveform. These two waveforms are designed to operate over the Wideband Global SATCOM system as well as other transponded satellites, and are also forward compatible with the on-board processing capabilities of the future Protected Tactical Satellites (PTS). WAMS enables the use of WGS X and Ka-band resources to assure access to mission critical communications to provide Resilient Command and

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

Control (RC2) capabilities in contested/degraded environments, formerly known as Anti-Access/Area Denial (A2AD). The use of WAMS PTW on WGS will augment AEHF Extended Data Rate (XDR) services to provide the information throughput capacity necessary to support critical Command and Control capability.

Joint Aerial Layer Network-Maritime (JALN-M) is the Navy implementation of the JALN architecture which provides assured communications in any environment, especially in a satellite denied environment. With disruption or loss of Space tier communications, JALN-M establishes and/or restores connectivity. A critical component of RC2 capabilities is Adaptive Coding (AC) software development incorporation into the baseline NMT terminal including the Advanced Time Division Multiple Access (TDMA) Interface Processor (ATIP) in addition to supporting the JALN-M demonstration. This capability autonomously enhances maximum throughput and supports degraded conditions by adjusting End-to-End code rate to provide continuous, mission critical, and protected communications. The JALN-M Demo completed in FY18.

Development efforts, including Adaptive Coding, Time of Day, and the Wideband Anti-Jam Modem System (WAMS) augment the baseline NMT system to pace the evolving threats to the warfighter. The Time of Day (TOD) capability promotes communications reliability and resiliency; when the channel is degraded due to inclement weather or adversarial action. TOD enables the system to automatically transition to a more robust, lower code rate resulting in ability to maintain satellite link thereby allowing the fleet to preserve communications.

Technology Insertion, studies and implementation is necessary for military satellite communications systems development to support emerging technologies for Commercial Broadband Satellite Program (CBSP) and Global Broadcast Service (GBS) Terminals in the out years.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: NMT Resilient C2 Development	19.671	17.729	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Software and hardware upgrade development is ongoing to provide Resilient Command and Control (RC2) capabilities to pace the evolving threats to the warfighter in contested/degraded environments. The Wideband Anti-Jam Modem System (WAMS) will provide an anti-jamming capability that will counter various adversary threats. Adaptive Coding (AC) will autonomously maximize throughput in degraded or benign conditions over the Advanced Extremely High Frequency (AEHF) satellites, providing significantly more throughput than is available today in the baseline NMT. The Time of Day (TOD) capability promotes communications reliability and resiliency; when the channel is degraded due to inclimate weather or adversarial action. TOD enables the system to automatically transition to a more robust, lower code rate resulting in ability to maintain satellite link thereby allowing the fleet to preserve communications.					
FY 2019 Plans: Complete major Time of Day (TOD) software design development efforts on the affected systems, NMT and ATIP, to implement the more robust AC capability. The NMT and ATIP vendors will develop parallel Engineering Change Proposals (ECPs) to design and ensure the interoperability of AC software and TOD encryption that					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
will enable a more robust, lower code rate when the link margin is degraded. The program will undertake NSA certification of AC TOD encryption solution and author a Key Management Plan (KMP) to support key generation, distribution and operation of the AC TOD encryption. The ToD encryption functionality will be hosted in the ATIP and allow for continued operations during degraded link environments using lower code rate / data rate without dropping the communications link. The program will develop test plans and execute test events to verify system of systems capability. This includes the development of the network interface of Automated Digital Network System (ADNS) to support a dynamic bandwidth capability that enables data rate to change based on modem link condition on the radio to router interface. This will complete the integration and testing of NMT and ATIP design development as well as development plans for TOD encryption solution and associated technical and system risk reduction. NMT will continue to support the Air Force Lead Developmental Test Organization (LDTO) EPS events and EPS Multi-Service Operational Test and Evaluation (MOT&E) to include completion of test reports and documenting configuration setting on the Navy Last Mile. Define the Navy's WAMS technical baseline for integration into NMT. Continue to develop and design the Modem Mission Management System interim (MMSi) and Key Management System interim (KMSi) interfaces, including integration strategies for MMS/KMS operational compatibility with the DoD Protected Tactical Enterprise Service (PTES) ground solution architecture. This will also include Navy specification development and review of the Air Force Technical Requirements Documents (TRD). Obtain and certify space assets and ground facilities to support testing and assessment of Engineering Design Model (EDM) modems. Develop test plans and procedures to commence Navy testing of USAF EDM modems after delivery. Testing will include analysis of three separate vendor EDM designs procured from the USAF Protected Tactical Field Service Demonstration (PTSFD) effort. The testing process verifies and validates the vendor designs to ensure that Navy unique performance (antenna handover) and environmental (shock, vibration, temperature, and humidity) requirements are addressed in the design. Navy testing of both surface and submarine terminal variant EDM WAMS modems in Navy Labs. Testing will verify and validate waveform and system specification compliance and help refine the Navy test plan and schedule which will allow for the coordination of joint Initial Operational Capability (IOC) test events with the Air Force. ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The decrease from FY19 to FY20 is due to the realignment of Project Unit 0728 from PE 1203109N to PE 0303109N beginning in FY20.					
Title: Joint Aerial Layer Network Maritime (JALN-M) ***Articles:*** ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	2.059 -	0.000 -	0.000 -	0.000 -	0.000 -
Title: Technology Insertion ***Articles:*** ***Description:*** Overall program efforts include technology insertion implementation and associated testing required to support satellite communications. ***FY 2019 Plans:*** N/A ***FY 2020 Base Plans:*** N/A ***FY 2020 OCO Plans:*** N/A	0.100 -	0.000 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	21.830	17.729	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/3216: *NAVY MULTIBAND TERMINAL (NMT)*	62.113	109.385	88.021	-	88.021	70.187	24.249	16.585	20.281	73.062	1,551.433

Remarks

Funding for NMT OPN in PE 0303109N starting in FY20.

The Other Appropriation represents remaining procurement and installation of NMT production units for Afloat and Shore requirements to reach Full Operational Capability. Funding also includes the procurement and installation of Assured Command and Control (AC2) modems as well as the installation of Advanced Time Division Multiple Access (TDMA) Interface Processors (ATIPs), X/KA Back-Fits, and Ashore Antennas.

D. Acquisition Strategy

The Navy Multiband Terminal (NMT) Follow-On Full Deployment (FOFD) contract will continue NMT production for Afloat platforms and Shore locations, in support of the Chief of Naval Operations and the Department of the Navy (DON), and will allow the NMT Program to complete Full Operational Capability (FOC) . The competitive contract awarded to Comtech supports the development of Advanced Time Division Multiple Access (TDMA) Interface Processor (ATIP) and Assured Command and Control (AC2) modem enhancements such as Adaptive Coding. A new competitive contract will be awarded to support development and procurement of the Wideband Anti-Jam Modem System (WAMS).

E. Performance Metrics

The RDT&E goal for the NMT program is to create a military satellite communications system that consolidates capabilities of current and future satellite systems into a single terminal, and develops terminal communications capabilities that will counter all current and projected threats to satellite operations enabling communications in all environments.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 0728 / *EHF SATCOM Terminals*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development Time of Day (TOD)	C/CPAF	RAYTHEON : Marlborough, MA	0.000	3.140	Dec 2017	1.886	Dec 2018	0.000		-		0.000	0.000	5.026	-
Software Development ATIP Adaptive Coding (AC) /Time of Day (TOD)	C/CPFF	COMTECH : Tempe, AZ	0.000	3.225	Dec 2017	1.716	Dec 2018	0.000		-		0.000	0.000	4.941	-
Software Development Engineering	C/CPFF	NUWC : Newport, RI	0.000	3.062	Jan 2018	3.598	Jan 2019	0.000		-		0.000	0.000	6.660	-
Software Development Engineering	WR	SSC PAC : San Diego, CA	0.000	0.581	Jan 2018	0.565	Jan 2019	0.000		-		0.000	0.000	1.146	-
WAMS EDM Hardware	C/CPIF	RAYTHEON : Marlborough, MA	0.000	0.550	Aug 2018	0.000	Jan 2019	0.000		-		0.000	0.000	0.550	-
WAMS EDM Hardware	C/CPIF	L3 Systems West: : Salt Lake City, UT	0.000	0.485	Aug 2018	0.000		0.000		-		0.000	0.000	0.485	-
WAMS EDM Hardware	C/CPIF	ViaSat : Carlsbad, CA	0.000	0.317	Aug 2018	0.000		0.000		-		0.000	0.000	0.317	-
		Subtotal	0.000	11.360		7.765		0.000		-		0.000	0.000	19.125	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Integration/ Government Oversight	WR	NUWC : Newport, RI	0.000	1.254	Nov 2017	1.123	Nov 2018	0.000		-		0.000	0.000	2.377	-
Software Integration Support	WR	SSC PAC : San Diego, CA	0.000	0.793	Nov 2017	0.725	Nov 2018	0.000		-		0.000	0.000	1.518	-
Software Engineering Support	C/CPFF	SYSTECH : San Diego, CA	0.000	2.348	Nov 2017	2.016	Nov 2018	0.000		-		0.000	0.000	4.364	-
WAMS Studies and Design	FFRDC	MIT/LL : Lexington, MA	0.000	0.500	Jan 2018	1.095	Jan 2019	0.000		-		0.000	0.000	1.595	-
WAMS Cybersecurity Engineering	WR	NSA : Fort Meade, MD	0.000	0.000		0.250	Jan 2019	0.000		-		0.000	0.000	0.250	-
		Subtotal	0.000	4.895		5.209		0.000		-		0.000	0.000	10.104	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 0728 / *EHF SATCOM Terminals*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
EPS & JALN-M Development Test and Evaluation	WR	SSC PAC : San Diego, CA	0.000	3.728	Nov 2017	3.396	Nov 2018	0.000		-		0.000	0.000	7.124	-
Operational Test & Evaluation	WR	COMOPTEVFOR : Norfolk, VA	0.000	0.009	Nov 2017	0.000		0.000		-		0.000	0.000	0.009	-
		Subtotal	0.000	3.737		3.396		0.000		-		0.000	0.000	7.133	N/A

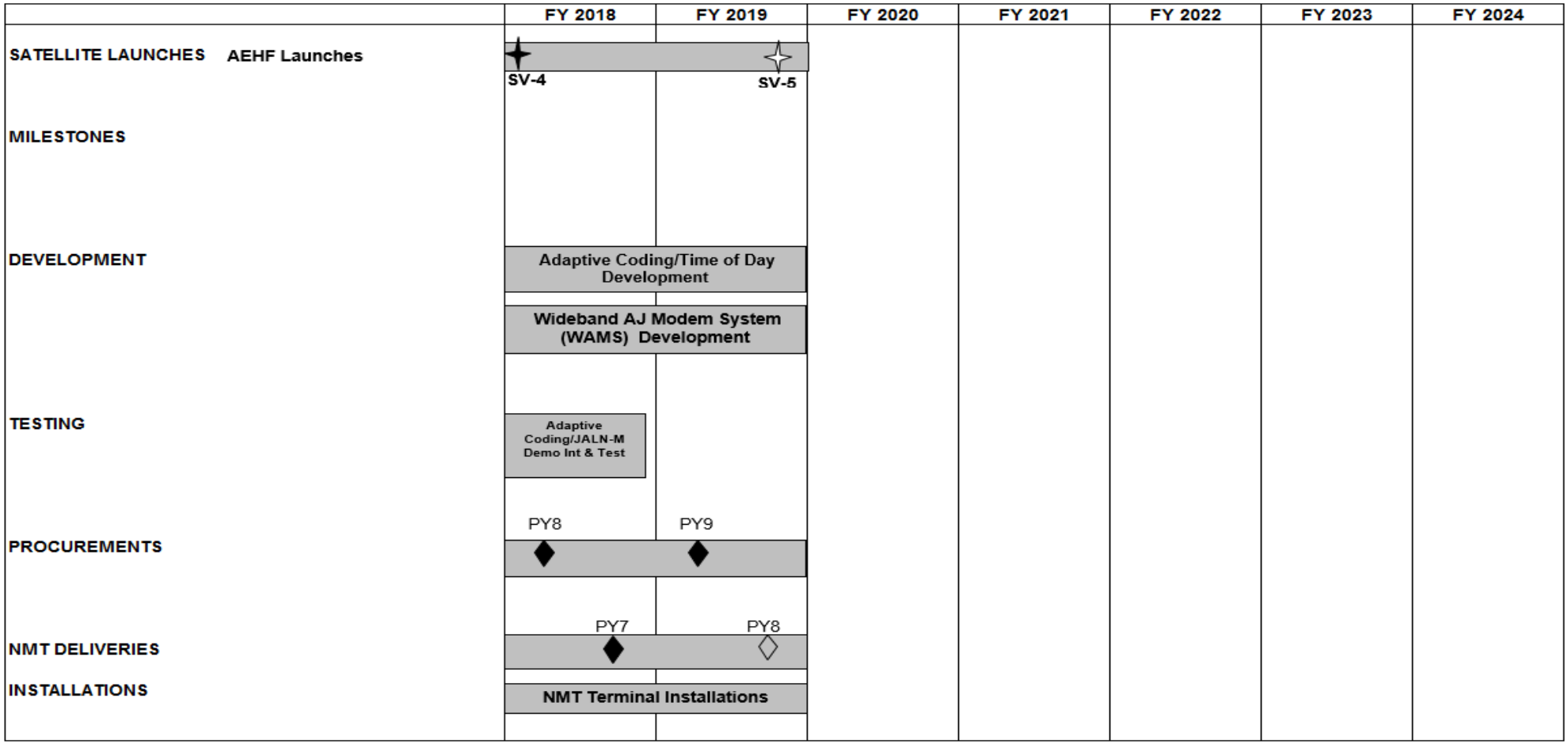
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Management	C/CPFF	BAH : San Diego, CA	0.000	0.232	Nov 2017	0.170	Nov 2018	0.000		-		0.000	0.000	0.402	-
Program Management	C/CPFF	BAH : San Diego, CA	0.000	1.556	Nov 2017	1.139	Nov 2018	0.000		-		0.000	0.000	2.695	-
Travel	Various	SPAWAR : Various	0.000	0.050	Nov 2017	0.050	Nov 2018	0.000		-		0.000	0.000	0.100	-
		Subtotal	0.000	1.838		1.359		0.000		-		0.000	0.000	3.197	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	21.830		17.729		0.000		-		0.000	0.000	39.559	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*



Notes:
FY20-24 NMT funding is provided under PE 0303109N Project 0728.

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 0728 / *EHF SATCOM Terminals*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0728				
AEHF Launch SV-4	1	2018	1	2018
AEHF Launch SV-5	4	2019	4	2019
Adaptive Coding & JALN-M Integration & Testing	1	2018	4	2018
Wideband AJ Modem Development	1	2018	4	2019
NMT Procurement Year (PY8)	2	2018	2	2018
NMTI Procurement Year (PY9)	2	2019	2	2019
NMT FRP PY7 Delivery	3	2018	3	2018
NMT FRP PY8 Delivery	3	2019	3	2019
A2AD Adaptive Coding/Time of Day	1	2018	4	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 2472 / *Mobile User Objective Sys (MUOS)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2472: *Mobile User Objective Sys (MUOS)*	0.000	13.556	15.530	15.868	-	15.868	23.086	22.088	17.376	16.454	35.416	159.374
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 345

A. Mission Description and Budget Item Justification

Mobile User Objective System (MUOS) provides a worldwide, multi-service population of mobile and fixed-site terminal users with Ultra High Frequency (UHF) Narrowband, beyond line of sight satellite communications (SATCOM). MUOS significantly increases performance and capacity in support of critical Combatant Command SATCOM priorities. MUOS is the replacement system for the UHF Follow-on (UFO) system, which is currently beyond its design life. MUOS consists of Space, Ground, and User Entry Segments. The Space Segment consists of 5 geosynchronous satellites, one which is an on-orbit spare, and provides both a legacy UHF payload, which is backward compatible with UFO, and a Wideband Code Division Multiple Access (WCDMA) payload, which provides 3G cellular-like capability. The Ground Segment consists of four world-wide Radio Access Facilities (RAFs) and two satellite control facilities. Each RAF includes three 60 ft. antennas, and numerous racks of equipment. The RAF in Hawaii includes a Network Management Facility (NMF). The RAFs in Hawaii and Virginia each include a Switching Facility (SF). The User Entry Segment consists of the MUOS waveform that is ultimately integrated into MUOS-capable terminals. The MUOS legacy capability has been in operational use since 2012, and the WCDMA capability transitioned to Early Combatant Command Use in July 2016.
In addition to providing UHF SATCOM for the Department of Defense, the Navy has the overall responsibility to deliver the End-to-End MUOS capability to the warfighter. This responsibility involves systems engineering, integration, and test management of all MUOS system of system activities.

The FY20 program funds system optimization and modernization to address the dynamic, worldwide electromagnetic and cybersecurity environment in which MUOS operates. Efforts include technical analyses and engineering efforts for rapid technology insertion, and necessary changes requested by the warfighter and radio program offices to align end-to-end MUOS capabilities with warfighter missions. These changes include: software improvements for faster radio start-up and connection to the MUOS system; and software changes to allow end users to move radio profile information from one radio to another. Funds also support integration of the MUOS waveform into MUOS-capable terminals and the subsequent terminal certification testing. Funds are required for completion of Multi-Service Operational Test and Evaluation-2B (MOT&E-2B) activities in order to achieve Full Operational Capability (FOC) and deliver the End-to-End MUOS capability to the warfighter.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Mobile User Objective Sys (MUOS)	13.556	15.530	15.868	0.000	15.868
Articles:	-	-	-	-	-
FY 2019 Plans: FY19 funds activities to prepare for and conduct Development Test and Multi-service Operational Test and Evaluation-2B (MOT&E-2B), due to the June 2016 Director, Operational Test & Evaluation (DOT&E) assessment					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 2472 / *Mobile User Objective Sys (MUOS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
that found Mobile User Objective System (MUOS) not operationally effective or suitable. Additionally, FY19 funds support the engineering and research efforts as part of the Ultra-High Frequency (UHF) Narrowband satellite communications (SATCOM) Analysis of Alternatives (AoA). FY19 continues support of integration of the MUOS waveform into MUOS-capable terminals and execution of certification testing of MUOS-capable terminals in support of Department of Defense terminal programs. Continue to address operational test deficiencies, particularly addressing the capability to monitor system status and provide situational awareness for the system operators. Continue to address emerging cybersecurity requirements. Continue development of a modernized geolocation Ground Segment subsystem in order to meet baseline requirements. Continue to address the dynamic, worldwide electronic magnetic environment through system optimization to ensure capacity is available to the end user. ***FY 2020 Base Plans:*** FY20 funds system optimization, electro-magnetic interference mitigation efforts, continues development of a modernized geolocation Ground Segment subsystem, and continues addressing emerging cybersecurity requirements to ensure capacity is available to the end user. FY20 funds post-test activities required for completion of MOT&E-2B, to include data analysis and final test report. Additionally, FY20 funds continue support of integration of the MUOS waveform into MUOS-capable terminals and subsequent terminal certification testing. FY20 funds End to End (E2E) MUOS Usability Enhancements and improvements to over-the-air provisioning and profile portability. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in funding from FY19 to FY20 is to fund E2E MUOS usability enhancements. These changes include: software improvements for faster radio start-up and connection to the MUOS system; and software changes to allow end users to move radio profile information from one radio to another.					
Accomplishments/Planned Programs Subtotals	13.556	15.530	15.868	0.000	15.868

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• WPN/2433: *Fleet Satellite Comm Follow-On*	39.532	60.279	67.380	-	67.380	53.460	45.985	46.907	47.846	243.162	2,705.300

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 2472 / *Mobile User Objective Sys (MUOS)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

Currently interim contractor support and engineering activities are procured via the baseline Mobile User Objective System (MUOS) Risk Reduction and Design Development contract. The program is working to transition these Space, Ground and User Entry Segments activities to dedicated sustainment contracts. Integration of the MUOS waveform into MUOS-capable terminals and execution of certification testing of MUOS-capable terminals are executed primarily by the Navy Working Capital Funded Space and Naval Warfare Systems Command (SPAWAR) Systems Center Pacific.

E. Performance Metrics

MUOS Goal: Achieve Full Operational Capability in FY 2020.

Metric: Successful completion of Multi-Service Operational Test and Evaluation-2B (MOT&E-2B) FY19.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 2472 / *Mobile User Objective Sys (MUOS)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Contract	C/CPAF	Lockheed Martin : Sunnyvale, CA	0.000	7.700	Oct 2017	7.850	Oct 2018	0.000		-		0.000	0.000	15.550	-
Follow On Contract	SS/IDIQ	TBD : TBD	0.000	0.000		0.000		11.377	Oct 2019	-		11.377	0.000	11.377	-
		Subtotal	0.000	7.700		7.850		11.377		-		11.377	0.000	26.927	N/A

Remarks

The MUOS (Project 2472) increase in FY20 funds End to End (E2E) MUOS usability enhancements.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	SSC PAC : San Diego, CA	0.000	1.515	Oct 2017	1.104	Oct 2018	0.000		-		0.000	0.000	2.619	-
Operational Test & Evaluation	WR	COTF : Norfolk, VA	0.000	0.250	Oct 2017	2.048	Oct 2018	0.450	Oct 2019	-		0.450	0.000	2.748	-
		Subtotal	0.000	1.765		3.152		0.450		-		0.450	0.000	5.367	N/A

Remarks

FY20 funds a small amount of work required to finish Multi-service Operational Test and Evaluation-2B (MOT&E-2B) activities.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contract Engineering Support	C/CPFF	SBG : Alexandria, VA	0.000	2.795	Oct 2017	3.100	Oct 2018	2.000	Oct 2019	-		2.000	0.000	7.895	-
Government Engineering	WR	SSC PAC : San Diego, CA	0.000	1.296	Oct 2017	1.428	Oct 2018	2.041	Oct 2019	-		2.041	0.000	4.765	-
		Subtotal	0.000	4.091		4.528		4.041		-		4.041	0.000	12.660	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 2472 / *Mobile User Objective Sys (MUOS)*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	13.556		15.530		15.868		-		15.868	0.000	44.954	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 2472 / *Mobile User Objective Sys (MUOS)*

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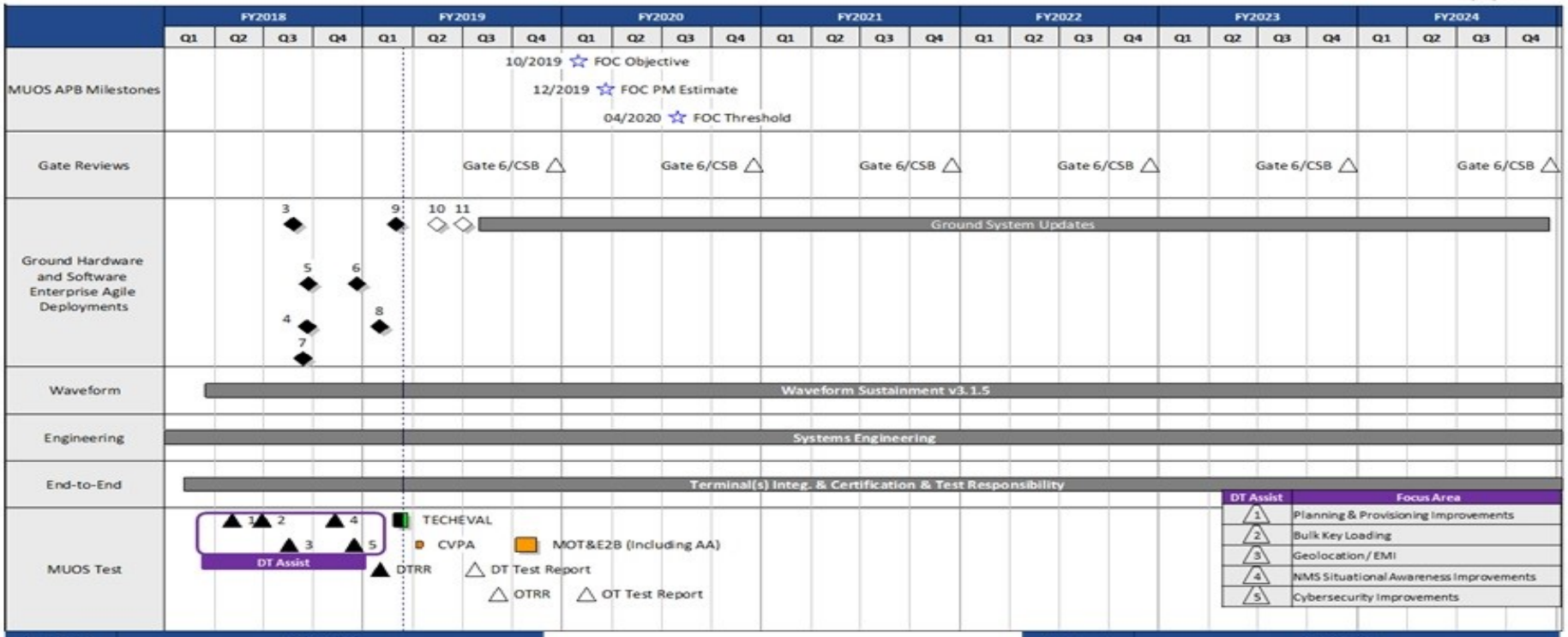

Acronym	Definition
AA	Adversarial Assessment
APB	Acquisition Program Baseline
ATO	Authority to Operate
CSB	Configuration Steering Board
CVPA	Cooperative Vulnerability Penetration Assessment
DT	Development Test
DTRR	Development Test Readiness Review

Acronym	Definition
EMI	Electro Magnetic Interference
FOC	Full Operational Capability
NMS	Network Management Segment
OT	Operational Test
OTRR	Operational Test Readiness Review
TECHEVAL	Techincal Evaluation

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 2472 / *Mobile User Objective Sys (MUOS)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2472				
Systems Engineering	1	2018	4	2024
Terminal Integration, Certification, and Test	1	2018	4	2024
Waveform Sustainment	1	2018	4	2024
Developmental Test Assist Event 1	2	2018	2	2018
Developmental Test Assist Event 2	2	2018	2	2018
Developmental Test Assist Event 3	3	2018	3	2018
Agile Deployments 3-5	3	2018	3	2018
Agile Deployment 7	3	2018	3	2018
Agile Deployment 6	4	2018	4	2018
Agile Deployment 8	1	2019	1	2019
Developmental Test Assist Event 4	4	2018	4	2018
Developmental Test Assist Event 5	4	2018	4	2018
Agile Deployment 9	1	2019	1	2019
Developmental Test Readiness Review	1	2019	1	2019
Tech Eval	1	2019	1	2019
Cooperative Vulnerability Penetration Assessment	2	2019	2	2019
Agile Deployment 10	2	2019	2	2019
Agile Deployment 11	3	2019	3	2019
Ground System Updates	3	2019	4	2024
DT Test Report	3	2019	3	2019
Operational Test Readiness Review	3	2019	3	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 2472 / *Mobile User Objective Sys (MUOS)*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MOT&E2B / Adversarial Assessment	4	2019	4	2019
Gate 6/CSB FY19	4	2019	4	2019
Full Operational Capability (FOC) Objective	1	2020	1	2020
Full Operational Capability (FOC) Program Manager Estimate	1	2020	1	2020
OT Test Report	1	2020	1	2020
Full Operational Capability (FOC) Threshold	3	2020	3	2020
Gate 6/CSB FY20	4	2020	4	2020
Gate 6/CSB FY21	4	2021	4	2021
Gate 6/CSB FY22	4	2022	4	2022
Gate 6/CSB FY23	4	2023	4	2023
Gate 6/CSB FY24	4	2024	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 3398 / *Enterprise SATCOM Gateway Modems (ESGMs)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
3398: *Enterprise SATCOM Gateway Modems (ESGMs)*	0.000	0.116	0.915	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.031
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Navy Global Broadcast Service (GBS) Program is the Navy component of the Joint Military Satellite Communications (MILSATCOM) program that delivers the continuous flow of high-speed, high-volume communication and information flow for deploying, deployed, on the move, and garrisoned forces. The GBS system supports the Navy Strategic Plan and equips warfighters with a proven Resilient Command and Control (RC2) capability. GBS provides Satellite Communications (SATCOM) capability for forces afloat, ashore, and Naval Special Warfare Command.

The Enterprise SATCOM Gateway Modem (ESGM) is the Department of Defense (DoD) Chief Information Officer directed solution to satisfy the Transmission Security (TRANSEC) requirement. This modem will replace the existing modem in the GBS System. Testing and fielding of the Enterprise SATCOM Gateway Modems (ESGMs) is a joint venture, operationally directed by the Defense Information Systems Agency (DISA) and the United States Air Force (USAF) as the lead service. Additionally, the ESGM will continue to enable GBS reception of the Digital Video Broadcast - Satellite 2nd Generation (DVB-S2).

FY19 GBS activities will complete Joint GBS integration and support the Joint GBS DT/OT event.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Enterprise SATCOM Gateway Modems (ESGMs)	0.116	0.915	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2019 Plans: United States Air Force (USAF) will follow up with a Joint Services DT/OT. Complete environmental quality tests to support the Joint led GBS-ESGM technical baseline. Participate in DISA test planning for Joint-specific GBS and Navy-specific requirements during GBS Joint ESGM DT and OT activities.					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 3398 / *Enterprise SATCOM Gateway Modems (ESGMs)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Decrease of $0.915M from FY19 to FY20 is due to completion of testing efforts finalizing the Joint led GBS-ESGM technical baseline.					
Accomplishments/Planned Programs Subtotals	0.116	0.915	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The GBS program reached a Full Rate Production Decision on 24 Oct 2008 and is in sustainment. The Enterprise Satellite Communications (SATCOM) Gateway Modem (ESGM), the Commercial Off-The-Shelf (COTS) Internet Protocol (IP) modem, provides Transmission Security functionality in support of DoD CIO direction to implement Information Assurance for all transmission media.

E. Performance Metrics

The RDT&E goal for the GBS program is to create a military satellite communications system that supports current and future requirements for Resilient Command and Control (RC2) and Information Assurance.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 3398 / *Enterprise SATCOM Gateway Modems (ESGMs)*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering	WR	SSC PAC : San Diego, CA	0.000	0.000		0.188	Nov 2018	0.000		-		0.000	0.000	0.188	-
Systems Engineering	WR	NUWC : Newport, RI	0.000	0.116	Nov 2017	0.165	Nov 2018	0.000		-		0.000	0.000	0.281	-
Systems Engineering	WR	SSC LANT : Charleston, SC	0.000	0.000		0.200	Nov 2018	0.000		-		0.000	0.000	0.200	-
		Subtotal	0.000	0.116		0.553		0.000		-		0.000	0.000	0.669	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	C/CPFF	SYSTECH : San Diego, CA	0.000	0.000		0.163	Nov 2018	0.000		-		0.000	0.000	0.163	-
Operational Test & Evaluation	WR	COMOPTEVFOR : Norfolk, VA	0.000	0.000		0.133	Nov 2018	0.000		-		0.000	0.000	0.133	-
Developmental Test & Evaluation	WR	SSC PAC : San Diego, CA	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	0.000	0.000		0.296		0.000		-		0.000	0.000	0.296	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/CPFF	BAH : San Diego	0.000	0.000		0.061	Nov 2018	0.000		-		0.000	0.000	0.061	-
Travel	Reqn	SPAWAR : Various	0.000	0.000		0.005	Nov 2018	0.000		-		0.000	0.000	0.005	-
		Subtotal	0.000	0.000		0.066		0.000		-		0.000	0.000	0.066	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.116		0.915		0.000		-		0.000	0.000	1.031	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 3398 / *Enterprise SATCOM Gateway Modems (ESGMs)*	

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 3398 / *Enterprise SATCOM Gateway Modems (ESGMs)*

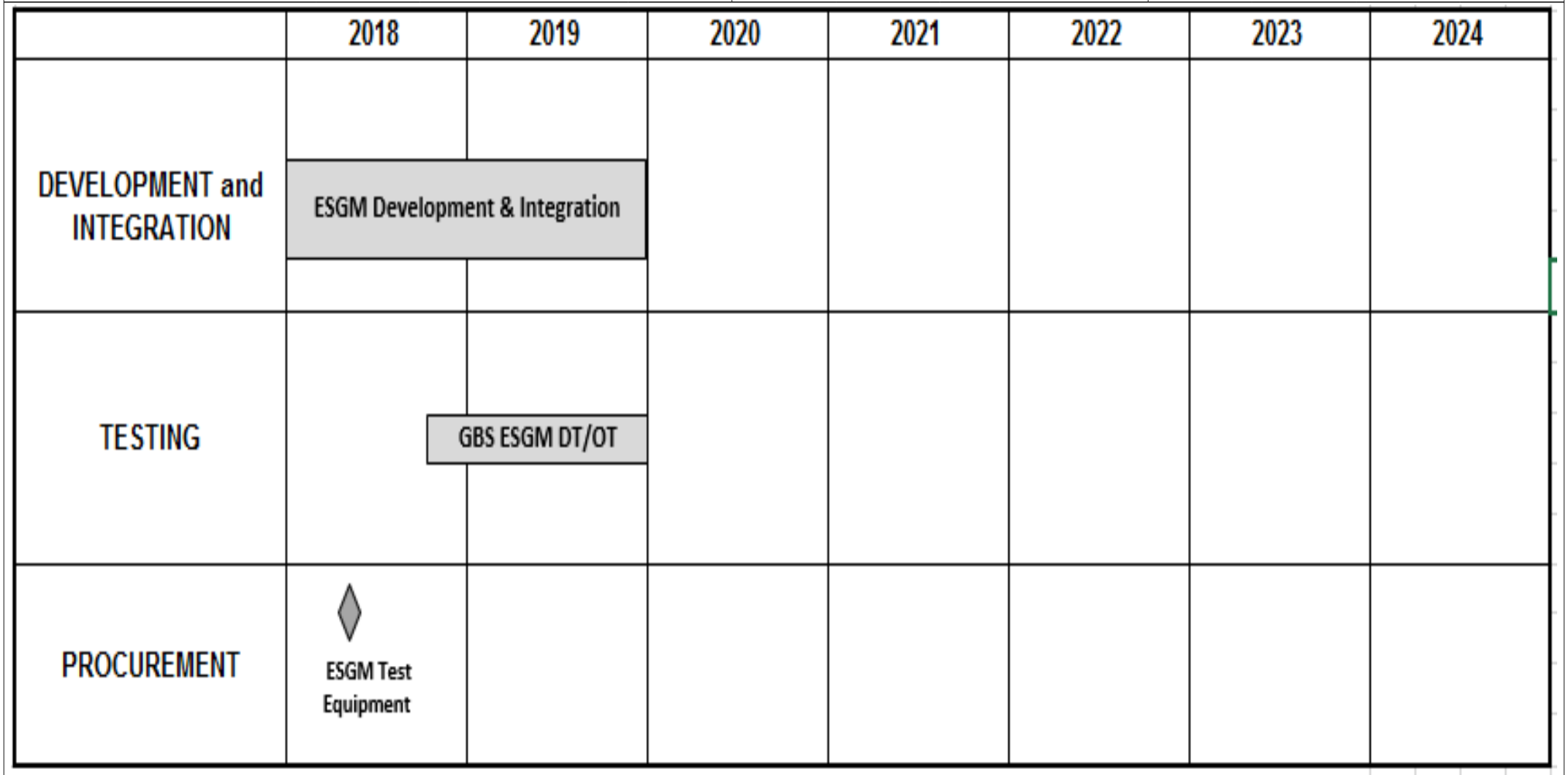

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 3398 / *Enterprise SATCOM Gateway Modems (ESGMs)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3398				
ESGM Environmental Quality Testing	1	2018	4	2019
GBS ESGM DT/OT	3	2018	4	2019
ESGM Test Equipment Buy	2	2018	2	2018

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	4.828	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.828
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Congressional Add provides for the development, test and evaluation of enhanced capabilities for the Navy Multiband Terminal (NMT) by furthering Science & Technology (S&T) research and transition activities associated with resilient communications capabilities. Specifically, this funding will provide for technology testing, evaluation, demonstration and validation for an analog canceller for Wideband Satellite Communications (SATCOM) interface mitigation, modular hardware open platform for wideband SATCOM interface mitigation, and an all-digital modem.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019
Congressional Add: NMT Development	4.828	0.000
FY 2018 Accomplishments: Developed, tested and evaluated an analog canceller for Wideband Satellite Communications (SATCOM) interface mitigation by building an integrated photonic based analog canceller prototype and integrating it into the overall SATCOM system. Developed, tested and evaluated modular hardware open platform for wideband SATCOM interface mitigation, establish a test platform and sub-system lab testing. Developed, tested and evaluated an all-digital modem prototype.		
FY 2019 Plans: N/A		
Congressional Adds Subtotals	4.828	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

The performance goal is met if successful development test and evaluation is achieved.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 1203109N / *(U)Satellite Communications (SPACE)*	Project (Number/Name) 9999 / *Congressional Adds*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Analog Canceller	C/CPFF	TBD : TBD	0.000	1.500	Feb 2019	0.000		0.000		-		0.000	0.000	1.500	-
Modular Hardware Open Platform	C/CPFF	TBD : TBD	0.000	1.300	Feb 2019	0.000		0.000		-		0.000	0.000	1.300	-
All Digital Modem	C/CPFF	TBD : TBD	0.000	1.478	Feb 2019	0.000		0.000		-		0.000	0.000	1.478	-
		Subtotal	0.000	4.278		0.000		0.000		-		0.000	0.000	4.278	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Services Support	WR	SPAWAR System Center : San Diego, CA	0.000	0.230	Sep 2018	0.000		0.000		-		0.000	0.000	0.230	-
		Subtotal	0.000	0.230		0.000		0.000		-		0.000	0.000	0.230	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation	WR	SPAWAR System Center : San Diego, CA	0.000	0.320	Sep 2018	0.000		0.000		-		0.000	0.000	0.320	-
		Subtotal	0.000	0.320		0.000		0.000		-		0.000	0.000	0.320	N/A

	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	4.828		0.000		0.000		-		0.000	0.000	4.828	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 9999 / *Congressional Adds*

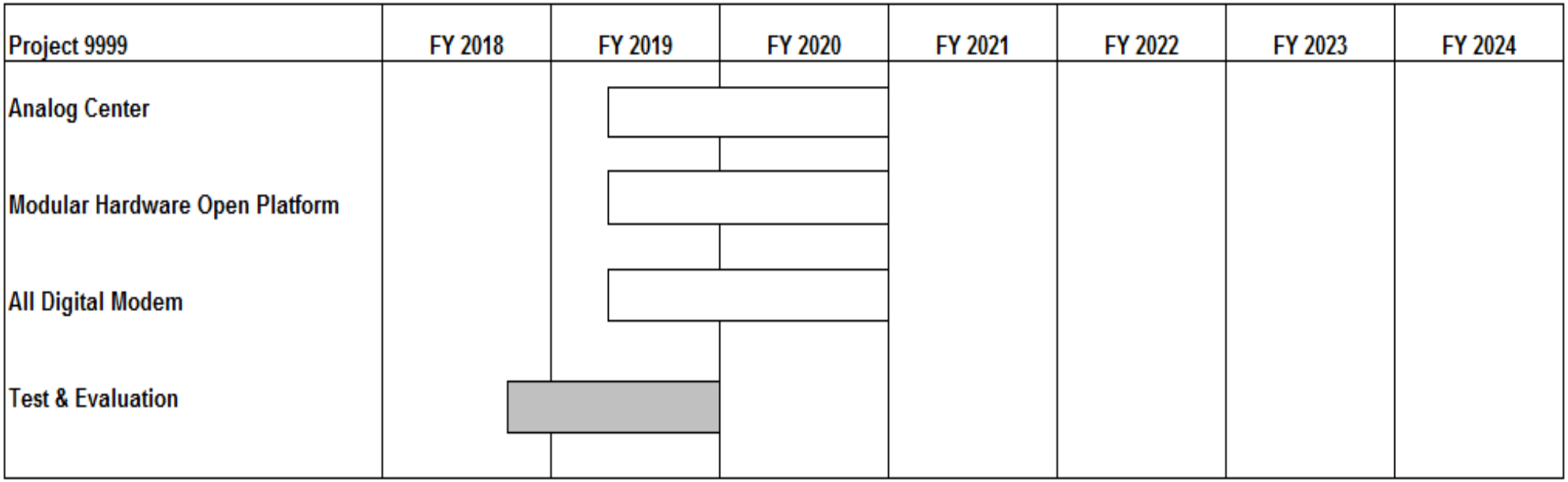

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 1203109N / *(U)Satellite Communications (SPACE)*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Analog Canceller: Schedule Detail	2	2019	4	2020
Modular Hardware Open Platform: Schedule Detail	2	2019	4	2020
All Digital Modem: Schedule Detail	2	2019	4	2020
Test & Evaluation: Schedule Detail	4	2018	4	2019