Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy	Date: February 2018
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604756N *I Ship Self Def (Engage: Hard Kill)*

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	837.373	115.081	212.412	178.538	-	178.538	157.285	129.808	118.655	83.155	Continuing	Continuing
0167: *5in Rolling Airframe Missile*	242.192	17.437	41.178	26.280	-	26.280	22.008	6.248	4.154	4.242	Continuing	Continuing
0173: *NATO Sea Sparrow*	585.311	86.868	134.205	97.694	-	97.694	88.873	79.293	81.011	47.958	Continuing	Continuing
0243: *ALaMO*	0.000	5.594	26.175	24.714	-	24.714	0.000	0.000	0.000	0.000	0.000	56.483
2070: *OTH Missile*	0.000	0.000	0.000	19.968	-	19.968	28.162	26.556	11.349	8.441	Continuing	Continuing
9081: *Phalanx CIWS SEARAM*	6.798	0.346	10.854	9.882	-	9.882	18.242	17.711	22.141	22.514	Continuing	Continuing
9999: *Congressional Adds*	3.072	4.836	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.908

A. Mission Description and Budget Item Justification

This program element provides funding for the development of systems that fulfill a portion of the third phase of the Ship Self Defense: Engage Hard Kill. Development in this line will focus on hard kill capabilities in which missiles are used to intercept incoming Anti-Ship Cruise Missiles (ASCM). Missile and system improvements necessary to meet their requirements are being addressed via NATO SEASPARROW Missile System (NSSMS) (0173), Rolling Airframe Missile (RAM) (0167), Advanced Low Cost Munition Ordnance (ALaMO) (0243), Over-The-Horizon (OTH) missile (2070), and Phalanx Close-In Weapon System (CIWS) SeaRAM (9081). Missile improvements include improved kinematic performance plus advanced seeker and low elevation fusing/warhead capability improvements. CIWS System improvements include Technology Refresh for current and future fleet population. ALaMO (0243) qualifies a guided 57mm projectile with an active seeker for United States Navy (USN) use. ALaMO provides enhanced lethality against Fast In-shore Attack Craft (FIAC) when compared to existing 57mm ammunition.

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	114.475	212.412	211.957	-	211.957
Current President's Budget	115.081	212.412	178.538	-	178.538
Total Adjustments	0.606	0.000	-33.419	-	-33.419
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.393	0.000			
• Program Adjustments	0.000	0.000	-30.500	-	-30.500
• Rate/Misc Adjustments	0.000	0.000	-2.919	-	-2.919

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy					Date: February 2018
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*		R-1 Program Element (Number/Name) PE 0604756N *I Ship Self Def (Engage: Hard Kill)*			
• Congressional General Reductions	-0.001	-	-	-	-
Adjustments					
• Congressional Add Adjustments	5.000	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2017	FY 2018
Project: 9999: *Congressional Adds*		
Congressional Add: *Electronics Enclosure Redesign Efforts*	4.836	0.000
Congressional Add Subtotals for Project: 9999	4.836	0.000
Congressional Add Totals for all Projects	4.836	0.000

Change Summary Explanation

The FY 2019 funding request was reduced by $33.419 million between PB 2018 and PB 2019 as follows:

The FY 2019 funding request was reduced by $0.334 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

FY 2019 rate/miscellaneous decreases of $2.585 million is due to changes in the purchase inflation and other rate changes across all projects.

Project 0173 NATO Seasparrow - Funding in the amount of $11.4M was rephased from FY 2019 to FY 2020. The funding rephase adjusts ESSM RDTEN to smooth development ramps and begin tapering in FY 2023 after SSDS IOT&E completes. Stalker supports Improved Stalker (I-Stalker), which will provide incremental improvements to the currently fielded Stalker Long Range Electro-Optic Sensor System (SLREOSS) in response to a 2016 United States Fleet Forces Command (USFFC) Operational Needs Statement (ONS).

Project 9081 CIWS SEARAM - Funding in the amount of $8.0M was rephased and added in the outyears. The three major components of the CIWS Tech Refresh efforts are Electric Gun Drive System, Electronics Enclosure(ELX) Modernization, and Local Control Station (LCS) and Remote Control Station (RCS)Redesign.

Project 2070 OTH Missile - Decrease of $11.1M due to the procurement of Over The Horizon Weapon System (OTH WS)non-recurring mission support equipment, training hardware, and test articles being deferred to the out years.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 0167 / *5in Rolling Airframe Missile*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
0167: *5in Rolling Airframe Missile*	242.192	17.437	41.178	26.280	-	26.280	22.008	6.248	4.154	4.242	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The RAM program is an international cooperative program with the government of the Federal Republic of Germany. The purpose of this program is to develop, test, and field a surface-to-air self-defense system utilizing a dual mode, passive radio frequency/infrared RAM. The baseline system RAM Block 0/1/1A provide defense capability against active and passive anti-ship missiles, very low altitude missiles, and maneuvering missiles through the utilization of passive radio frequency and infrared seekers and a maritime optimized fuse. The RAM Block 2 upgrade programs are a cooperative requirement of the U.S. and Federal Republic of Germany, as agreed to in an international Memorandum of Understanding (MOU), and allows RAM to counter emerging, highly maneuverable ASCM threats utilizing advanced seekers while maintaining all the proven capabilities of RAM Block 0/1/1A's accurate terminal guidance, proven lethality, and no shipboard post launch dependence. Funding supports formal Developmental and Operational Testing (DT/OT) scheduled through FY 2018, data analysis, operational/test driven studies, support of combat system performance analysis and identification of operationally relevant improvements. The RAM BLK 2A Fire Control Loop Improvement Project (FCLIP) will provide software only modifications to the missile and launcher to improve raid performance. The RAM BLK 2B Raid ECP will provide an upgraded seeker and Missile-to-Missile Link (MML) capability to counter emerging complex raid threats. Development and test of RAM BLK 2B Raid ECP will occur through FY 2022.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Rolling Airframe Missile Block 2 Development and Test	17.329	41.068	26.168	0.000	26.168
Articles:	-	-	-	-	-
FY 2018 Plans: Funds completion of Integrated OT&E (Development and Operational) OT-C5 (Probability of Raid Annihilation, PRA, Testbed) testing, analysis, testbed accreditation, incorporation of any changes and associated efforts to support a FRP decision (2018). Funds continued design, integration, and test of the FCLIP combat system changes. Funds support conducting FCLIP development flight test and final verification and qualification testing as well as initial transition to production. Funding for RAM BLK 2 Raid ECP will support preliminary design work, development and delivery of prototype designs and verification testing with a PDR and MML prototype demonstration test. Funds will also support hardware procurement in FY 2018 for proof of manufacturing flight testing in FY 2020 due to long lead materials.					
FY 2019 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0167 / *5in Rolling Airframe Missile*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Funds continued development of the RAM Blk 2 Raid ECP. Supports detailed design phase with continued integration testing, to include subsystem design verification testing. A CDR will be conducted in Q2 FY 2019 and the first Controlled Test Vehicle (CTV) flight test will take place in Q2 FY 2019. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease in FY 2019 due reduction in RAM BLK 2B Raid ECP efforts.					
Title: Rolling Airframe Missile Block 2 Travel	0.108	0.110	0.112	0.000	0.112
Articles:	-	-	-	-	-
FY 2018 Plans: Fund program office travel to support program/testing as required by program schedule and in accordance with travel reduction mandate. ***FY 2019 Base Plans:*** Fund program office travel to support program/testing as required by program schedule and in accordance with travel reduction mandate. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase in FY 2019 in travel supporting RAM BLK2B Raid ECP efforts.					
Accomplishments/Planned Programs Subtotals	17.437	41.178	26.280	0.000	26.280

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• WPN 2242: *RAM*	95.557	58.587	96.221	-	96.221	130.981	136.863	233.558	228.085	700.344	2,812.355
• OPN 5231: *Ship Missile Support Equipment*	8.175	7.800	16.158	-	16.158	7.464	10.072	7.195	6.835	Continuing	Continuing

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0167 / *5in Rolling Airframe Missile*

D. Acquisition Strategy

The RAM Program uses directed sole source contracts with Raytheon Missile Systems Company, Tucson, AZ.

E. Performance Metrics

Successfully complete DT/OT.

Achieved Initial Operational Capability (IOC) decision and support a FRP decision.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0167 / *5in Rolling Airframe Missile*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Block 2 Upgrade	C/CPAF	Various : Various	154.650	0.000		0.000		0.000		-		0.000	0.000	154.650	-
Primary Hardware Dev/Blk 1	Various	Various : Various	10.081	0.000		0.000		0.000		-		0.000	0.000	10.081	-
FCLIP	WR	PHD : CA	0.193	0.000		0.000		0.000		-		0.000	0.000	0.193	-
FCLIP	SS/CPFF	AECOM : VA	0.232	0.274	Feb 2017	0.543	Feb 2018	0.257	Dec 2018	-		0.257	0.000	1.306	-
Raid ECP	SS/CPFF	Raytheon : Tucson/ Louisville	9.969	5.032	Feb 2017	25.394	Oct 2017	18.574	Dec 2018	-		18.574	0.000	58.969	-
FCLIP	SS/CPFF	Raytheon : Tucson/ Louisville	21.791	10.950	Nov 2016	8.130	Jan 2018	5.392	Dec 2018	-		5.392	0.000	46.263	-
Raid ECP	SS/CPFF	JHU/APL : MD	0.000	0.450	Dec 2016	0.103	Feb 2018	0.050	Dec 2018	-		0.050	0.000	0.603	-
FCLIP	WR	China Lake : CA	1.710	0.000		0.927	Jan 2018	0.480	Nov 2018	-		0.480	0.000	3.117	-
Raid ECP	WR	China Lake : CA	0.000	0.245	Jan 2017	0.497	Jan 2018	0.380	Nov 2018	-		0.380	0.000	1.122	-
FCLIP	SS/CPFF	JHU/APL : MD	0.236	0.000		0.202	Feb 2018	0.100	Dec 2018	-		0.100	0.000	0.538	-
Raid ECP	WR	PHD : CA	0.000	0.050	Feb 2017	0.000		0.000		-		0.000	0.000	0.050	-
Raid ECP	SS/CPFF	AECOM : VA	0.000	0.126	Feb 2017	0.373	Feb 2018	0.378	Dec 2018	-		0.378	0.000	0.877	-
Raid ECP	SS/FFP	Raytheon : Tucson	0.000	0.000		4.000	Mar 2018	0.000		-		0.000	0.000	4.000	-
		Subtotal	198.862	17.127		40.169		25.611		-		25.611	0.000	281.769	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Studies and Analysis	Various	Various : Various	1.210	0.000		0.000		0.000		-		0.000	0.000	1.210	-
		Subtotal	1.210	0.000		0.000		0.000		-		0.000	0.000	1.210	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0167 / *5in Rolling Airframe Missile*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support	C/CPFF	Raytheon : Tucson	17.136	0.202	Nov 2016	0.549	Nov 2017	0.300	Nov 2018	-		0.300	0.000	18.187	-
Test Support	WR	China Lake/PHD : CA/CA	12.400	0.000		0.200	Oct 2017	0.157	Oct 2018	-		0.157	Continuing	Continuing	Continuing
FOT&E	WR	China Lake : PHD, CA	4.701	0.000		0.000		0.000		-		0.000	0.000	4.701	-
Miscellaneous	Various	Various : Various	5.765	0.000		0.000		0.000		-		0.000	0.000	5.765	-
Test Support	SS/CPFF	JHU/APL : MD	0.467	0.000		0.150	Nov 2017	0.100	Nov 2018	-		0.100	0.000	0.717	-
		Subtotal	40.469	0.202		0.899		0.557		-		0.557	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	Program Office : VA	1.504	0.108	Oct 2016	0.110	Oct 2017	0.112	Oct 2018	-		0.112	Continuing	Continuing	Continuing
Defense Acquisition Workforce Development Fund	Various	various : various	0.147	0.000		0.000		0.000		-		0.000	0.000	0.147	-
		Subtotal	1.651	0.108		0.110		0.112		-		0.112	Continuing	Continuing	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	242.192	17.437		41.178		26.280		-		26.280	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0167 / *5in Rolling Airframe Missile*

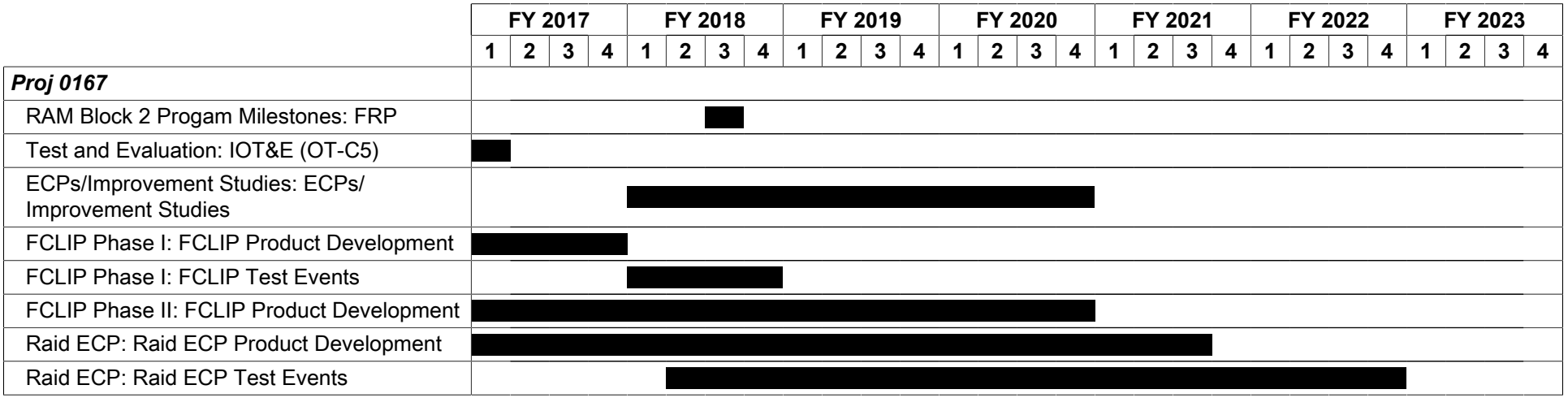

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0167 / *5in Rolling Airframe Missile*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0167				
RAM Block 2 Progam Milestones: FRP	3	2018	3	2018
Test and Evaluation: IOT&E (OT-C5)	1	2017	1	2017
ECPs/Improvement Studies: ECPs/Improvement Studies	1	2018	4	2020
FCLIP Phase I: FCLIP Product Development	1	2017	4	2017
FCLIP Phase I: FCLIP Test Events	1	2018	4	2018
FCLIP Phase II: FCLIP Product Development	1	2017	4	2020
Raid ECP: Raid ECP Product Development	1	2017	3	2021
Raid ECP: Raid ECP Test Events	2	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 0173 / *NATO Sea Sparrow*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
0173: *NATO Sea Sparrow*	585.311	86.868	134.205	97.694	-	97.694	88.873	79.293	81.011	47.958	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project encompasses five (5) primary efforts to enhance ship self-defense:

1. Evolved SEASPARROW Missile (ESSM) Blk 1 is a cooperative effort among 10 NATO SEASPARROW Nations and the U.S. to provide crucial defense battlespace and fire power against the fast, low altitude, highly maneuverable Anti-Ship Cruise Missile (ASCM) threat. Modifications were made to both the MK 41 Vertical Launch System (VLS) to fire from a single cell with 4 ESSM (QuadPack) and the NATO SEASPARROW Surface Missile System (NSSMS), fielding ESSM Blk 1 onboard CVN 68, LHD 1, LHA 7, CG 47, and DDG 51 class ships. ESSM Blk 1 integration efforts continue to bring the capability to CVN 78 and DDG 1000. Testing scheduled for FY18 includes ESSM Blk 1 firings from the Self Defense Test Ship in support of DDG 1000 class integration, AEGIS B/L 9C2 live fire testing, and Combat Systems Ship Qualification Trials live fire tests aboard CVN 72 and LHD 2.

2. NATO SEASPARROW Technical Direction Agent (TDA) - TDA support for the NSSMS Mk 57 Mods 12-15 which is integrated with the Ship Self Defense System (SSDS) Mk 2 to provide ship missile defense utilizing an open architected design on all CVN, LHA, and LHD class ships. A Missile Launcher Upgrade (MLU) is scheduled for Mk 57 platforms making each upgraded ship ESSM Blk 1 and ESSM Blk 2 capable.

3. ESSM Blk 2 Risk Reduction/ESSM Blk 2 Engineering and Manufacturing Development (EMD):
ESSM Blk 2 upgrade is a cooperative effort between U.S Navy and NATO SEASPARROW Consortium Nations. ESSM Blk 2 upgrade replaces the largely obsolete guidance section with a dual mode Active/Semi-Active X-Band seeker capable of defeating future threat capabilities within the existing envelope, including; smaller signatures, increased raid sizes, and adverse environments including countermeasures. Threat types include: advanced ASCMs, Anti-Ship Ballistic Missiles, surface and asymmetrical. The U.S. RDT&E funding accounts for 40% of the overall ESSM Blk 2 Development Program. Year-to-year fluctuations in funding levels are due to the variations in contributions provided by the other Nations. Through FY17, the US has funded approximately 25% of the total effort, driving the US portion of the EMD annual cost to 79% from FY18 - FY20.

4. Dual-Band Transceiver (DBT). The ESSM Blk 2 missile will utilize a DBT for in-flight data communications. This two-way datalink enables control and management of the missile during flight. This DBT leverages the new DDG 1000 / CVN 78 X-Band Transceiver to incorporate the functions to support S-Band Aegis data link (i.e. a Dual Band Transceiver). This resolves S-band obsolescence issues and provides a common transceiver across the ESSM inventory.

5. Transition to Production (TTP). Transition to Production execution ensures the design (Hardware, Software, Test Equipment, Production Tooling, etc.), defined during the E&MD Phase is successfully transitioned out of the engineering environment into a stable and capable production/manufacturing environment. During the early phase of Block 1 production the program experienced a series of 'process control failures' and 'production stoppages' leading to a "Blue Team" assessment and findings. One of the key underlying conditions identified as contributing to the discrepancies above was "incomplete transition to production activities and inadequate systems

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

engineering." The Block 2 TTP phase of program execution exists to address the shortfalls identified in the "Blue Team" report and to ensure the requisite resources are in place to support the program as design activities end and Low Rate Initial Production(LRIP) begins to deliver missiles at a rate commensurate with the requirements of LRIP and Full Rate Production (FRP).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Evolved Sea Sparrow Missile (ESSM) testing	2.880	5.000	11.224	0.000	11.224
Articles:	-	-	-	-	-
FY 2018 Plans: Conduct Waterfront Integration Testing and begin ESSM Joint Universal Weapons Link (JUWL) live fire testing on SDTS using Zumwalt combat system. Begin flight testing on the Self Defense Test Ship supporting DDG 1000 and CVN 78 combat systems and participate in the planning of the ship's Combat System Ship Qualification Trials (CSSQT) for DDG 1000 and CVN 78. Begin Waterfront Integration Testing with Aegis Advanced Capability Build (ACB) 16 and conduct flight tests. Conduct live fire event during LHD 2 and CVN-72 CSSQT. The program is expected to support waterfront integration testing (WIT) events for DDG1000 and CVN78 on the self-defense test ship (SDTS), as well as 24 firings for DDG1000 and 1 for CVN78 (both from the SDTS), and 2 additional combat system ship qualification tests (CSSQTs). However, FY18 funding levels do not support the full test regime. The program estimates it is short roughly $1.3M for DDG1000 support in FY18.					
FY 2019 Base Plans: Conduct CVN 78 Waterfront Integration Tests on lead ship and participate in CSSQT. Continue supporting Aegis ACB 16 live fire testing. Participate in the planning and execution of ZUMWALT CSSQT. Continue operational flight tests for DDG 1000 and CVN 78 combat systems on SDTS and lead ship. The program is expected to support WIT events on DDG1000 and CVN78, as well as 4 firings from DDG 1000, 20 firings from CVN78, 6 additional CSSQTS, and development of the AEGIS and CVN test beds.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: Increase in FY 2019 due to IWS 12.0 supporting WIT events on DDG1000 and CVN78, as well as 4 firings from DDG 1000, 20 firings from CVN78, 6 additional CSSQTS, and development of the AEGIS and CVN test beds.					
Title: NATO Sea Sparrow Combat System Integraton Technical Direction Agent (TDA)	0.304	0.313	0.323	0.000	0.323

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Articles:	-	-	-	-	-
FY 2018 Plans: In general terms, in the TDA will continue to provide expertise in reviewing and, where authorized by NATO SEASPARROW Program Office (NSPO), independently assessing and analyzing requirements, assessing upgrade options, evaluating requirements compliance, and deriving delta qualification testing/analysis requirements. In FY18, further efforts are expected in the area of radar improvements study and analysis, engineering support and risk mitigation planning associated with FCLIP efforts, Mk 9 improvements, and SSDS related upgrades linked to SSDS Advanced Capability Build (ACB) 20.					
FY 2019 Base Plans: In general terms, in the TDA will continue to provide expertise in reviewing and, where authorized by NATO SEASPARROW Program Office (NSPO), independently assessing and analyzing requirements, assessing upgrade options, evaluating requirements compliance, and deriving delta qualification testing/analysis requirements. In FY19, further efforts are expected in the area of radar improvements study and analysis, engineering support and risk mitigation planning associated with FCLIP efforts, Mk 9 improvements, and SSDS related upgrades linked to SSDS ACB20.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: Increase due to continued support providing expertise in reviewing, assessing, and analyzing requirements					
Title: Evolved Sea Sparrow Missile (ESSM) Blk 2 EMD	82.624	103.506	57.614	0.000	57.614
Articles:	-	-	-	-	-
FY 2018 Plans: Through FY17, the US has funded approximately 25% of the total effort, driving the US portion of the EMD annual cost to 79% from FY18 - FY20. Continue maturing the ESSM Block 2 design during the EMD phase of the program focusing on S/W and H/W development. Complete GTVs flight test; Execute Milestone C review; Complete Development Testing (DT) Tactical S/W Build; Prepare for DT and Operational Flight to include build-					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
up of DT flight-test rounds, continue Transition to Production (TTP) efforts, prepare for Functional Configuration Audit. ***FY 2019 Base Plans:*** Continue maturing the ESSM Block 2 design during the EMD phase of the program focusing on S/W and H/W development. Conduct DT flight testing. Prepare for Operational Flight to include build-up of OT flight-test rounds, continue Transition to Production (TTP) efforts, prepare for Functional Configuration Audit. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $45.892 due to funding in FY2018 increasing the US contribution to obtain ESSM Blk 2 40% MOU.					
Title: I-Stalker	0.000	2.999	3.626	0.000	3.626
Articles:	-	-	-	-	-
Description: Improved Stalker (I-Stalker) will provide incremental improvements to the currently fielded Stalker Long Range Electro-Optic Sensor System (SLREOSS) in response to a 2016 United States Fleet Forces Command (USFFC) Operational Needs Statement (ONS). SLREOSS was developed as a modular, portable, form/fit replacement for the NATO Sea Sparrow Missile System (NSSMS) MK 6 Low Light Level Television (LLLTV) in response to the 2010 Naval Forces Central Command (NAVCENT) Counter Swarm Urgent Operational Need (UON) to combat Fast Attack Craft/Fast Inshore Attack Craft (FAC/FIAC). It is currently being fielded in either the NSSMS MK6 MOD 3 LLLTV Director Mount configuration or NSSMS MK6 MOD 4 LLLTV Independent Mount configuration depending on platform specifications. I-Stalker will provide required upgrades to the SLREOSS Independent Mount configuration with the enhanced capabilities provided by the Navy owned Situational Awareness System (SAwS) to deliver an integrated radar and electro-optic/Infrared control and display suite. ***FY 2018 Plans:*** Initiate design and development of SAwS integration with Stalker (I-Stalker). - Initiate final design based on GHWB I-Stalker experimental efforts. - Initiate hardware fabrication of Engineering development Model (EDM). - Initiate software updates and perform design verification testing. ***FY 2019 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
- Complete final I-Stalker design - Complete hardware fabrication of EDM - Complete software updates and execute performance/qualification testing. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** The $0.627M increase in FY 2019 is due to performance / qualification testing, systems engineering and services.					
Title: Dual Band Transceiver (DBT) ***Articles:*** ***FY 2018 Plans:*** Complete DBT TTP activities; execute Design Verification Test (DVT) and support Safety related reviews Weapon Systems Explosive Safety Review (WSESRB) and Software System Safety Technical Review Panel (SSSTRP); analyze S-Band and X-Band test results; ; complete qualification events leading to ESSM Block 1 Class 1 ECP inputs for LOT F. ***FY 2019 Base Plans:*** N/A ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease due to Dual Band Transceiver completion in FY 2018.	1.060 -	1.799 -	0.000 -	0.000 -	0.000 -
Title: Transition to Production (TTP) ***Articles:*** ***FY 2018 Plans:*** To mitigate schedule risk during TTP contract negotiations, Raytheon has went out on a Contract Financial Risk (CFR) in supporting artifacts and activities associated with Production Readiness Review (PRR) in preparation for Milestone C and Presidio Generation 2 Block 15 Test Equipment (TE) procurement. Prior to the PRR supporting Milestone C event in June 2018, TTP plans to host the PRR pre-briefs with PRR panel members and Technical Review Team (TRT) member at NSPO. These briefs are to close out RFIs/RFAs from the previous	0.000 -	20.588 -	24.907 -	0.000 -	24.907 -

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
PRRs, outline the PRR artifacts and entry/exit criteria's, and provide plan and progress towards Milestone C for granting approval to proceed to Low-Rate Initial Production (LRIP). The major events for TTP in Fiscal Year 2018 are the PRR supporting Milestone C, Milestone C Production decision review, and LRIP 1 contract award. ***FY 2019 Base Plans:*** After the completion of the Milestone C production decision, TTP will be preparing for the LRIP activities associated with Test Equipment (TE) procurement, prove-in, and integration. As the program transitions from E&MD to Production, work is expected to shift from Proof of Manufacturing (POM) suppliers to production (Low-Rate Initial Production (LRIP)/ Full-Rate Production (FRP)) suppliers according to the workshare plan to support production work share requirements. To support workshare requirements, an incremental PRR (iPRR) session will be conducted to evaluate low-rate readiness in light of production start-up with new suppliers. LRIP 2 contract award is scheduled for November 2018. The major events for TTP in FY19 are the LRIP 2 contract award and iPRR supporting FRP PRR. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $4.319M supports preparation for LRIP activities associated with Test Equipment (TE) procurement, prove-in, and integration.					
Accomplishments/Planned Programs Subtotals	86.868	134.205	97.694	0.000	97.694

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• WPN 2307: *ESSM*	105.279	76.292	98.384	-	98.384	128.059	217.523	293.594	530.565	Continuing	Continuing
• OPN 5231: *Ship Missile Defense*	33.897	50.606	38.518	-	38.518	29.985	30.598	31.206	31.845	Continuing	Continuing
• OMN 1D4D: *NATO Seasparrow*	17.838	30.704	37.031	-	37.031	19.543	20.129	20.489	20.962	0.000	166.696

Remarks

Stalker program also funded by OPN.
OPN funding for Stalker is captured above in LI 5231 - Ship Missile Defense line as follows: FY18: $5.668M, FY19: $10.598M.
OPN funding for IWS 12.0 is captured above in LI 5231- Ship Missile Defense line as follows: FY18: $44.938M, FY19: $27.920M, FY20: $29.985M, FY21: $30.598M, FY22: $31.206M, FY23: $31.845M
OMN funding for Stalker is captured above in LI 1D4D - NATO Seasparrow line as follows: FY18: $1.801M, FY19: $3.469M

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
OMN funding is for ESSM Blk 1, ESSM Blk 2, NSSMS, & RIM-7											

D. Acquisition Strategy

ESSM Blk 2 EMD is a directed sole source contract to Raytheon Missile Systems Company.

I-Stalker: NSWC Crane to initiate and complete final design of hardware/software for integration of SAwS w/Stalker in preparation for sole source procurement (OPN) of Stalker Kits from the current design agent (Ball Aerospace) and SAwS Kits from NSWC Crane to meet CVN and LHD/LHA fleet deployment schedules.

E. Performance Metrics

Successfully conduct Developmental Testing/Operational Testing. Two ESSM Blk 2 Controlled Test Vehicle flight tests were successfully conducted in June 2017 onboard the Self Defense Test Ship at the Point Mugu Sea Range. Three subsequent Guided Test Vehicle flight tests are scheduled in FY 2018. The ESSM Blk 2 Milestone C decision is scheduled for Q4 FY 2018 with Initial Operational Capability for AEGIS platforms scheduled for 2020 and SSDS platforms in 2023. ESSM Blk 2 Low Rate Initial Production deliveries are expected to begin in 2020 with Full Rate Production rounds delivering to the Fleet in 2023.

I-Stalker: Initiate and complete final design, successful performance/qualification testing and delivery of EDM.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ESSM Systems Engineering/Firing Spt	WR	Corona : CA	9.692	0.705	Dec 2016	0.705	Oct 2017	0.705	Nov 2018	-		0.705	0.000	11.807	-
NATO OC System Engineering	C/ FFPLOE	Raytheon : RI	1.955	0.000		0.000		0.000		-		0.000	0.000	1.955	-
NATO OC - Software	C/ FFPLOE	Raytheon : RI	8.054	0.000		0.000		0.000		-		0.000	0.000	8.054	-
Stalker System Engineering	WR	NSWC Crane : IN	4.782	0.000		0.000		0.000		-		0.000	0.000	4.782	-
Stalker Hardware Engineering	WR	NSWC Crane : IN	14.350	0.000		0.000		0.000		-		0.000	0.000	14.350	-
Stalker Software Engineering	WR	NSWC Crane : IN	2.725	0.000		0.000		0.000		-		0.000	0.000	2.725	-
ESSM Primary Hardware Development	C/CPAF	Raytheon : Tuscon	193.941	0.000		0.000		0.000		-		0.000	0.000	193.941	-
ESSM Ancillary Hardware	Various	Various : Various	71.324	0.000		0.000		0.000		-		0.000	0.000	71.324	-
ESSM Blk 2 EMD	C/CPIF	Raytheon : Tuscon	90.599	70.255	Jul 2017	90.767	Oct 2017	44.413	Oct 2018	-		44.413	0.000	296.034	-
I-Stalker Systems Engineering	WR	NSWC Crane : Crane, IN	0.000	0.000		0.989	Feb 2018	1.240	Nov 2018	-		1.240	0.000	2.229	-
TTP	C/BA	Raytheon : Tuscon	0.000	0.000		20.588	Oct 2017	24.907	Oct 2018	-		24.907	0.000	45.495	-
ESSM Blk 2 Risk reduction	SS/ FFPLOE	Raytheon : Tuscon	44.150	0.000		0.000		0.000		-		0.000	0.000	44.150	-
NATO OC Systems Engineering SPT	WR	NSWC PHD : CA	0.700	0.000		0.000		0.000		-		0.000	0.000	0.700	-
Dual Band Tranceiver	SS/FFP	Raytheon : Tuscon	4.496	0.460	Jul 2017	1.199	Oct 2017	0.000		-		0.000	0.000	6.155	-
		Subtotal	446.768	71.420		114.248		71.265		-		71.265	0.000	703.701	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NATO System TDA	SS/FP	APL : MD	2.485	0.304	Dec 2016	0.313	Nov 2017	0.323	Nov 2018	-		0.323	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 0173 / *NATO Sea Sparrow*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NATO OC	SS/FFP	APL : MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Stalker -ISEA/TDA/RM&A	SS/FFP	various : various	0.750	0.000		0.000		0.000		-		0.000	0.000	0.750	-
ILS/Engineering Support	Various	Various : Various	15.543	0.000		0.000		0.000		-		0.000	0.000	15.543	-
ESSM Blk 2 EMD	WR	APL : MD	7.856	4.095	Dec 2016	4.218	Oct 2017	4.285	Oct 2018	-		4.285	0.000	20.454	-
ESSM Blk 2 EMD	WR	NAWC CL : CA	9.462	5.742	Dec 2016	5.914	Nov 2017	6.197	Nov 2018	-		6.197	0.000	27.315	-
ESSM Blk 2 EMD	Various	Various : Various	3.727	2.532	Jan 2017	2.607	Nov 2017	2.715	Nov 2018	-		2.715	0.000	11.581	-
I-Stalker Platform Integration	WR	Norfolk Naval Shipyard (NNSY) : Norfolk, VA	0.000	0.000		0.900	Nov 2017	0.600	Nov 2018	-		0.600	0.000	1.500	-
I-Stalker Platform Integration	C/BA	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.675	Nov 2017	0.450	Nov 2018	-		0.450	0.000	1.125	-
I-Stalker Platform Integration	C/BA	NSWC Crane : Crane, IN	0.000	0.000		0.315	Nov 2017	0.705	Nov 2018	-		0.705	0.000	1.020	-
NATO OC Support	WR	Dahlgren : VA	2.174	0.000		0.000		0.000		-		0.000	0.000	2.174	-
Dual Band Transceiver	WR	APL : MD	0.400	0.200	Dec 2016	0.200	Dec 2017	0.000		-		0.000	0.000	0.800	-
Dual Band Tranceiver	WR	NAWC CL : CA	0.800	0.400	Dec 2016	0.400	Dec 2017	0.000		-		0.000	0.000	1.600	-
		Subtotal	43.197	13.273		15.542		15.275		-		15.275	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ESSM Developmental Test & Evaluation	WR	NAWC CL : CA	21.845	0.202	Jan 2017	0.204	Oct 2017	0.250	Oct 2018	-		0.250	Continuing	Continuing	Continuing
ESSM OPEVAL/ TECHEVAL/Test Firings	WR	Corona, IHD, Dahlgren, SNSWC, PHD) : various	18.118	0.285	Jan 2017	0.285	Nov 2017	2.951	Nov 2018	-		2.951	0.000	21.639	-
ESSM Developmental Test & Evaluation	SS/FFP	APL : MD	5.782	0.100	Dec 2016	0.100	Oct 2017	0.500	Oct 2018	-		0.500	Continuing	Continuing	Continuing
ESSM Test & Evaluation	C/CPAF	Raytheon : Tuscon	18.917	1.000	Jun 2017	3.118	Nov 2017	3.364	Nov 2018	-		3.364	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ESSM Test & Evaluation	WR	Dahlgren/PHD : VA/ CA	2.342	0.372	Jan 2017	0.372	Nov 2017	1.698	Nov 2018	-		1.698	0.000	4.784	-
Developmental Test & Evaluation	WR	Dahlgren : VA	0.418	0.000		0.000		0.000		-		0.000	0.000	0.418	-
I-Stalker Development Test and Evaluation	WR	NSWC Crane : IN	0.000	0.000		0.120	Feb 2018	0.431	Nov 2018	-		0.431	0.000	0.551	-
		Subtotal	67.422	1.959		4.199		9.194		-		9.194	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ESSM-Support and Performing Activity	Allot	PHD/NAWC CL/ APL : CA/MD	14.879	0.116	Oct 2016	0.116	Oct 2017	1.660	Oct 2018	-		1.660	Continuing	Continuing	Continuing
ESSM-Travel	Allot	Program Office : VA	3.327	0.100	Oct 2016	0.100	Oct 2017	0.100	Oct 2018	-		0.100	Continuing	Continuing	Continuing
ESSM-Misc	Various	various : various	2.149	0.000		0.000		0.000		-		0.000	0.000	2.149	2.065
NATO Travel/Misc	Various	Program Office : various	2.111	0.000		0.000		0.000		-		0.000	0.000	2.111	-
Engineering Support	Various	Various : Various	5.458	0.000		0.000		0.000		-		0.000	0.000	5.458	-
I-Stalker Program Engr Svcs	C/CPIF	SPA : Washington, DC	0.000	0.000		0.000		0.200	Nov 2018	-		0.200	0.000	0.200	-
		Subtotal	27.924	0.216		0.216		1.960		-		1.960	Continuing	Continuing	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	585.311	86.868		134.205		97.694		-		97.694	Continuing	Continuing	N/A

Remarks

Various used for multiple vendors and location under threshold.

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

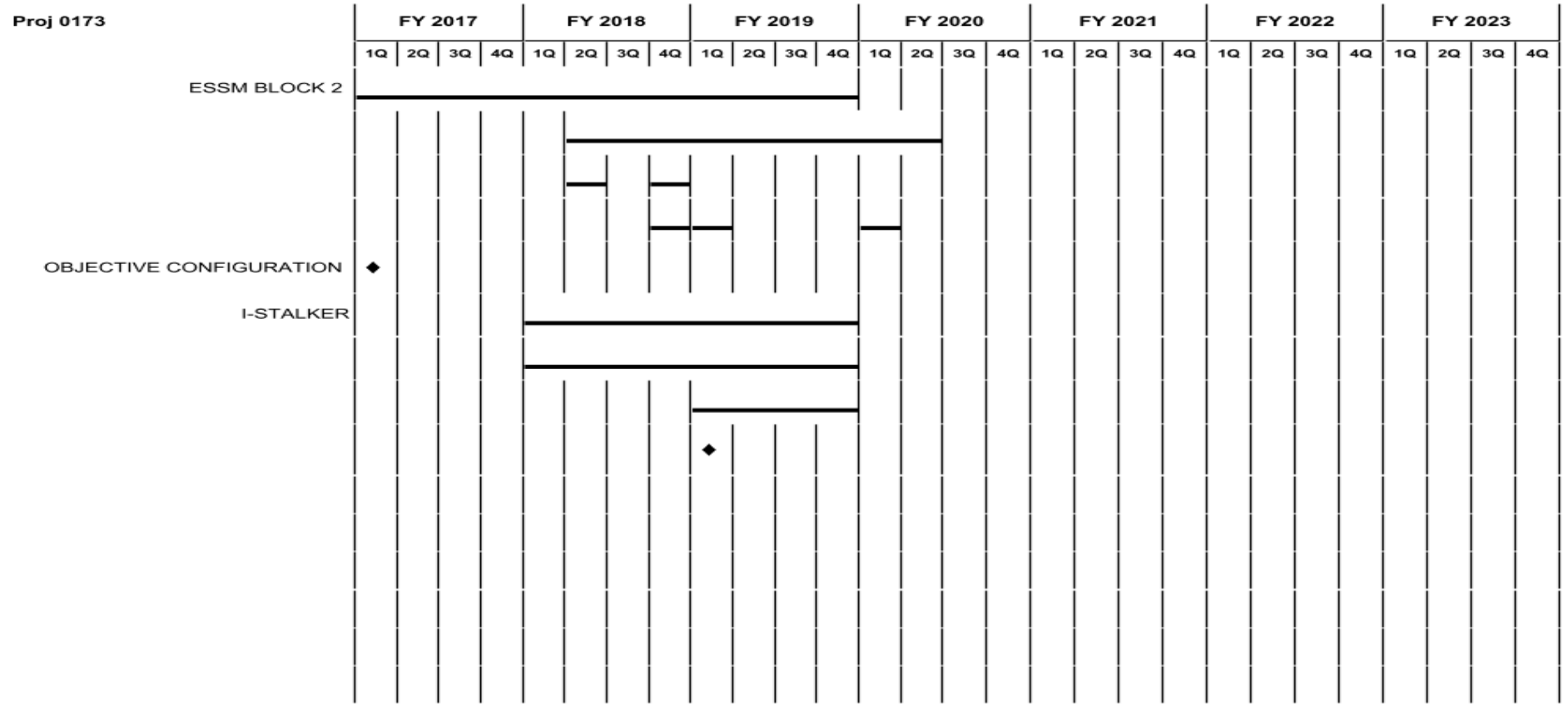

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0173 / *NATO Sea Sparrow*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0173				
ESSM BLOCK 2: Engineering and Manufacturing Development	1	2017	4	2019
ESSM BLOCK 2: Production MOU Negotiation/Signature	1	2017	4	2017
ESSM BLOCK 2: In Service Support MOU Negotiation/Signature	1	2017	3	2019
ESSM BLOCK 2: Transition to Production	2	2018	2	2020
ESSM BLOCK 2: Production Decision LRIP (Milestone C)	4	2018	4	2018
ESSM BLOCK 2: LRIP 1 Award	4	2018	4	2018
ESSM BLOCK 2: LRIP 2 Award	1	2019	1	2019
ESSM BLOCK 2: LRIP 3 Award	1	2020	1	2020
OBJECTIVE CONFIGURATION: CDR	1	2017	1	2017
I-STALKER: Transition to Production	1	2018	4	2019
I-STALKER: Final Design, Engineering, & Manufacturing Development	1	2018	4	2019
I-STALKER: Development Testing	1	2019	4	2019
I-STALKER: EDM Delivery	1	2019	1	2019

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 0243 / *ALaMO*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
0243: *ALaMO*	0.000	5.594	26.175	24.714	-	24.714	0.000	0.000	0.000	0.000	0.000	56.483
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 57mm MK 332 HE-4G Projectile significantly increases MK 110 Gun Mount lethality and effectiveness against Fast Attack Craft and Fast In-Shore Attack Craft (FAC/FIAC). The 57mm ALaMO concluded development as part of a classified program and transitioned to qualification for Navy use in FY 2017. ALaMO will transition to production at the conclusion of the program.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Systems Engineering and Testing	5.594	26.175	24.714	0.000	24.714
Articles:	-	-	-	-	-
FY 2018 Plans: Continue to procure hardware for design verification and performance verification test assets. Conduct MK 332 component and projectile design verification tests. Conduct radar and divert mechanism performance verification tests from land based test sites. Measure warhead fragmentation and conduct lethality modeling. Perform safety and suitability environmental qualification tests. Conduct the test planning for hazard classification and insensitive munitions qualification. Coordinate the planning for FY 2019 land based and shipboard DT events. Begin planning Initial Operational Test & Evaluation (IOT&E) with Commander Operational Test & Evaluation Force (COMOPTEVFOR).					
FY 2019 Base Plans: Procure balance of hardware for DT assets. Conduct remaining performance verification test. Conduct hazard classification and insentitive munitions qualification. Conduct remaining safety and suitability environmental qualification tests. Build DT test assets Conduct land based and shipboard DT events. Conduct Weapons System Explosives Safety Review Board reviews for qualification closure.					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0243 / *ALaMO*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Conduct Weapons System Explosives Safety Review Board reviews for DT events. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 decrease of $1.4M due to program finalizing procurement of Development Test hardware and various verification tests at the end of its R&D development lifecycle. Program will begin to procure LRIP quantities in FY 2019 under the ICAL PANMC budget in order to meet IOC in FY 2020.					
Accomplishments/Planned Programs Subtotals	5.594	26.175	24.714	0.000	24.714

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• PANMC/0266: *INTERMEDIATE CALIBER GUN AMMO HE-4G*	0.000	0.000	19.500	-	19.500	34.904	28.289	28.855	29.432	0.000	140.980

Remarks

Profile only reflects procurement of CART 57MM ALaMO (HE-4G). LRIP Procurement begins FY19 under the ICAL PANMC budget in order to meet IOC in FY20.

D. Acquisition Strategy

MK 332 HE-4G will be qualified for Navy use in FY2019.

E. Performance Metrics

Quarterly Program Reviews and semi-annual Product Certification Panel Reviews.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0243 / *ALaMO*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Produce Design Verification hardware, DT Hardware	MIPR	DOTC : PICATINNY ARSENAL, NJ	0.000	5.000	Mar 2017	20.444	Jan 2018	20.097	Jan 2019	-		20.097	0.000	45.541	49.300
		Subtotal	0.000	5.000		20.444		20.097		-		20.097	0.000	45.541	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Services	WR	NSWC, DD : Dahlgren, VA	0.000	0.493	Oct 2016	3.801	Oct 2017	2.965	Oct 2018	-		2.965	0.000	7.259	-
Government Engineering Services	WR	NSWC, IHEODTD : Indian Head, MD	0.000	0.101	Oct 2016	1.930	Oct 2017	1.652	Oct 2018	-		1.652	0.000	3.683	-
		Subtotal	0.000	0.594		5.731		4.617		-		4.617	0.000	10.942	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	5.594		26.175		24.714		-		24.714	0.000	56.483	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0243 / *ALaMO*

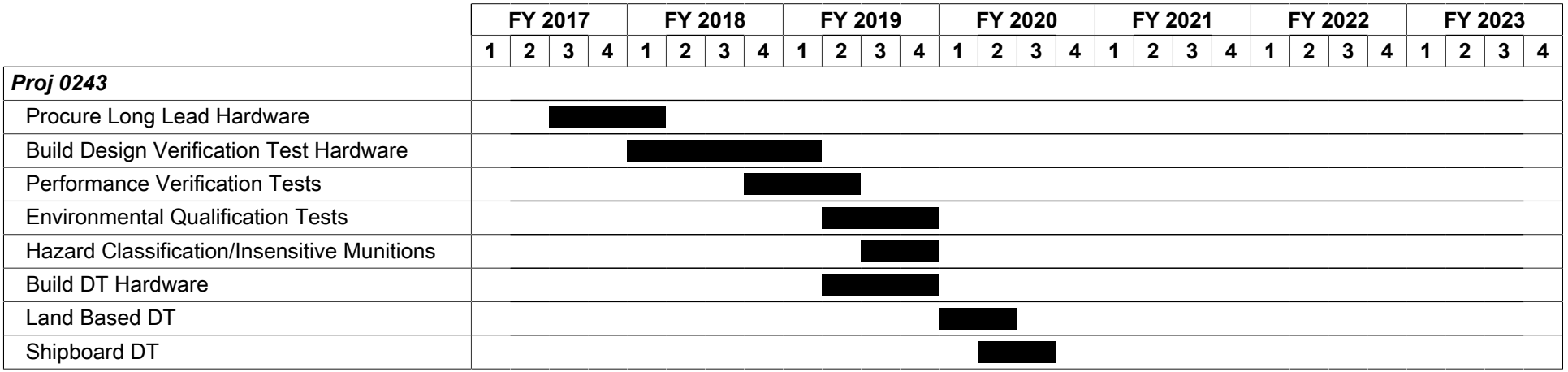

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 0243 / *ALaMO*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0243				
Procure Long Lead Hardware	3	2017	1	2018
Build Design Verification Test Hardware	1	2018	1	2019
Performance Verification Tests	4	2018	2	2019
Environmental Qualification Tests	2	2019	4	2019
Hazard Classification/Insensitive Munitions	3	2019	4	2019
Build DT Hardware	2	2019	4	2019
Land Based DT	1	2020	2	2020
Shipboard DT	2	2020	3	2020

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 2070 / *OTH Missile*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
2070: *OTH Missile*	0.000	0.000	0.000	19.968	-	19.968	28.162	26.556	11.349	8.441	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

OTH Missile funds competitive acquisition, testing, and fielding of a modern, technologically mature Over-the-Horizon Weapon System (OTH-WS) surface to surface missile capability to be installed onto commissioned and in-production Littoral Combat Ship /Frigate(LCS/FFG) beginning in FY 2021. This continues efforts begun in FY 2016 through FY 2018 Frigate PE 0603599N Project 3086. This is not a new start.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: OTH-WS Test and Evaluation and Systems Engineering	0.000	0.000	19.968	0.000	19.968
Articles:	-	-	-	-	-
FY 2018 Plans: N/A					
FY 2019 Base Plans: -Execute and initiate Over-the-Horizon Weapon System (OTH-WS) ship engineering activities, to include installation planning and design configuration on both Independence and Freedom LCS platforms. -Receive approval on OTH-WS required acquisition milestone documentation in accordance with DoD 5000.2. -Develop OTH-WS artifacts to support combat/system certifications required prior to system installation aboard LCS class ships. -Perform OTH-WS test and evaluation activities to include procurement of test assets, conduct of scenario working groups and development of firing scripts. -Initiate Test Planning Activities (Development and Operational testing (DT-OT), Environments, Electromagnetic interference (EMI) and electromagnetic compatibility (EMC), Qualifications, etc.). -Execute OTH-WS logistics requirements to include, the development of maintenance plans, inventory management conceptualization, movement of equipment and asset movement coordination, identification and coordination of ordnance					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 2070 / *OTH Missile*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
storage facilities, development of maintenance cards, and development of ordnance handling and loading procedures. -Provide overarching OTH-WS subject matter expertise to assist the program office with carrying out the surface to surface missile mission. -Begin OTH-WS Weapon System Explosives Safety Review Board (WSESRB) coordination and planning efforts (Software Systems Safety Technical Review Panel (SSSTRP), Fuse and Initiation System Technical Review Panel (FISTRP), Hazard of Electromagnetic Radiation to Ordnance (HERO), Insensitive Munitions (IM)). -Begin the Element Certification Planning, Production Engineering efforts (Ship Change document (SCD), Interface control Document (ICD) preparation, production processes and factory acceptance familiarization, cyber planning, ship interfaces/combat system familiarization). -Start Fleet training planning (Facility, Naval Training System Plan (NTSP) development). -Fund the initial Original Equipment Manufacturer (OEM) Design Agent Support. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $19.968M in FY 2019 to support planning and initial execution of new Over The Horizon Weapon System (OTH WS) capability for the Littoral Combat Ship/Frigate (LCS/FFG) platforms. This includes planning of test activities, training, and equired logistics for a missile footprint not currently in Navy inventory and program management functions. This continues efforts begun in FY 2016 - FY 2018 Frigate PE 0603599N Project 3086. This is not a new start as the funding was realigned from PE 0603599N Project 3086.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	19.968	0.000	19.968

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• RDTEN/0603599/3086: *Frigate / OTH Missile System*	2.980	1.700	1.784	-	1.784	0.000	0.000	0.000	0.000	0.000	6.806

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 2070 / *OTH Missile*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• OPN /5231: *Ship Missile Support Equipment/OTH Missile*	0.000	0.000	2.874	-	2.874	5.875	7.955	10.102	10.301	0.000	37.107
• WPN 2292: *LCS OTH Missile*	0.000	0.000	18.156	-	18.156	28.312	28.714	29.139	44.691	0.000	149.012

Remarks

D. Acquisition Strategy

The OTH-WS is an Acquisition Category (ACAT) II level weapon system production and sustainment program to provide the current Littoral Combat Ship (LCS) variants and Frigate (FFG) ships with an Over-the-Horizon Surface-To-Surface Missile (SSM) capability. The Navy intends to competitively select a technologically mature OTH-WS in FY 2018 and enter the Acquisition Cycle at Milestone C.

E. Performance Metrics

Performance metrics include awarding the Low Rate Initial Production (LRIP) 2 contract option for the OTH-WS, achieving a successful System Performance Verification Testing and initial Qualification Testing and Integrating training courses and materials into LCS schoolhouses. Additionally, the program office will continue installation planning and design configuration on required ship platforms (LCS/FFG), supporting combat/system certifications required prior to system installation, test planning activities to include; SSSTRP, FISTRP, Quick Reaction Assessment (QRA) and Operational Testing (OT), and the development and integration of logistics support requirements for the OTH-WS.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 2070 / *OTH Missile*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
OTH All Up Round (AUR) Technical Design Agent	WR	NAWC/WD : China Lake, CA	0.000	0.000		0.000		1.366	Oct 2018	-		1.366	Continuing	Continuing	Continuing
OTH Simulation and Analysis	WR	NSWC/COR : Corona, CA	0.000	0.000		0.000		0.290	Oct 2018	-		0.290	Continuing	Continuing	Continuing
OTH Weapon System Design Agent	WR	NSWC/DD : Dahlgren, VA	0.000	0.000		0.000		0.525	Oct 2018	-		0.525	Continuing	Continuing	Continuing
OTH Test & Evaluation / ILS	WR	NSWC/PHD : Port Hueneme, CA	0.000	0.000		0.000		0.750	Oct 2018	-		0.750	Continuing	Continuing	Continuing
OTH Weapon System Safety	WR	NSWC/DD : Dahlgren, VA	0.000	0.000		0.000		0.220	Oct 2018	-		0.220	Continuing	Continuing	Continuing
OTH Contractor Engineering Support	C/CPIF	Alion/ECS/GDIT : Arlington, VA	0.000	0.000		0.000		0.635	Dec 2018	-		0.635	Continuing	Continuing	Continuing
Weapons Systems Engineering Planning	SS/CPFF	JHU/APL : Laurel, MD	0.000	0.000		0.000		0.462	Dec 2018	-		0.462	Continuing	Continuing	Continuing
OEM Engineering Support	C/CPFF	TBD : TBD	0.000	0.000		0.000		3.200	Nov 2018	-		3.200	Continuing	Continuing	Continuing
Test & Evaluation Assets	C/FFP	TBD : TBD	0.000	0.000		0.000		12.000	Nov 2018	-		12.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		19.448		-		19.448	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
OTH Contractor Acquisiton Mgt Suppt	C/CPIF	CACI : Arlington, VA	0.000	0.000		0.000		0.320	Dec 2018	-		0.320	Continuing	Continuing	Continuing
OTH Program Management Support	C/CPIF	Strategic Insight : Arlington, VA	0.000	0.000		0.000		0.100	Dec 2018	-		0.100	Continuing	Continuing	Continuing
OTH Program Management Support	WR	PEO IWS : Arlington, VA	0.000	0.000		0.000		0.100	Oct 2018	-		0.100	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.520		-		0.520	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 2070 / *OTH Missile*	

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		19.968		-		19.968	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 2070 / *OTH Missile*

Over The Horizon-Weapon System

Fiscal Year	FY17	FY18	FY19	FY20	FY21	FY22
Program Acquisition	RFP		Contract Award LRIP1	Option 2 LRIP2	Option 3 LRIP3	Option 4 FRP
Major Reviews	R3B		ATP	MS C		PRR
Plan & Test	Test Planning/TEMP				PVT	OT
Qualification & Test			WSESRB		System Qual	

1

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 2070 / *OTH Missile*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2070				
Request For Proposal (RFP)	2	2017	2	2017
Test Planning Activities (TEMP, Environments, EMC/EMI, Qualifications)	2	2017	3	2018
Weapon System Explosives Safety Review Board Coordination and Planning (SSSTRP, FISTRP, HERO, IM)	2	2018	2	2020
System Qualification and Test	4	2018	1	2021
Maintenance Planning (ISEA, ILSP development, ILA support)	1	2018	4	2018
Training Planning (Facility, NTSP development)	2	2018	4	2018
Production Verification Testing (PVT)	2	2019	2	2020
Major Review - Production Readiness Review	4	2020	4	2020
Operational Testing	1	2021	2	2022

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 9081 / *Phalanx CIWS SEARAM*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
9081: *Phalanx CIWS SEARAM*	6.798	0.346	10.854	9.882	-	9.882	18.242	17.711	22.141	22.514	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MK 15 Close-In Weapons System (CIWS) is a fast reaction, rapid fire, computer controlled radar system utilizing either a 20mm gun (Phalanx) or a SeaRAM weapon system (SeaRAM) to meet its primary mission of providing Anti-Ship Missile (ASM) defense. CIWS fleet population exceeds 220 systems onboard nearly every USN surface combatant. In addition, CIWS continues to be installed on new construction surface ships with life expectancies of 25+ years. Basic system architecture is 20+ years old, hasn't had a significant R&D development effort since the 1990's, and is in need of Technology Refresh in order to avoid hardware obsolescence, maintain/improve reliability, increase capability, and provide affordable spare parts to achieve acceptable Operational Availability for the next 20+ years. Technology Refresh development starts in FY 2018 and will be fielded during CIWS overhauls and will consist of three efforts: Electric Gun Drive System (EGDS), Electronics Enclosure Modernization (ELX), and Local Control Station and Remote Control Station (LCS/RCS) Redesign. EGDS will replace the current pneumatic gun drive system that is difficult and costly to maintain with an all-electric drive system. EGDS will reduce maintenance/troubleshooting requirements, reduce support costs, and provide capability increases such as variable firing rates and reduced ammunition expenditures. ELX replaces costly and obsolete 1970's technology circuit card assemblies, servo controllers and electronic drawer backplanes with COTS digital devices, integrated controllers, and efficient power converters. ELX also will provide a reduction in weight of approx 960 lbs and simplified maintainability. LCS/RCS Redesign eliminates expensive obsolete components, decreases maintenance requirements and complexity, increases commonality between the LCS and RCS via open architecture, and simplifies the user operation by reducing Human Machine Interface requirements.

SeaRAM CIWS is deployed onboard DDG 64, 71, 75, and 78 in order to provide additional capability to meet emerging threats. Efforts include development, qualification, and testing of software and hardware modifications in order to support fielding on these AEGIS class ships. The SeaRAM installation schedule on DDG is as follows: DDG 78 completed March 2016; DDG 64 completed July 2016; DDG 75 completed November 2016; DDG 71 completed March FY 2017.

CIWS Next Generation has been deferred to future years.

Congressional Add funds of $4.836M received in FY 2017 for CIWS Technology Refresh for Electronics Enclosure Modernization. Congressional funds added into Project 9999.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: CIWS Tech Refresh	0.000	10.854	9.882	0.000	9.882
Articles:	-	-	-	-	-
FY 2018 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 9081 / *Phalanx CIWS SEARAM*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Non-recurring engineering efforts for CIWS Technology Refresh Modernization activities are focused on redesign of key subsystems, some of which date to the 1970s with obsolete and largely unsupportable electronics systems. Replacing these subsystems with modular "refreshed" components will reduce total ownership costs for the overall sustainment of the Phalanx system and provide a significant capability increase. - Electric Gun Drive System ***FY 2019 Base Plans:*** Continue CIWS Technology Refresh efforts for the Electric Gun Drive System. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Budget decrease from FY 2018 to FY 2019 is due to the rephrasing of CIWS Technology Refresh Modernization efforts.					
Title: SeaRAM on DDG Class ***Articles:*** ***FY 2018 Plans:*** N/A ***FY 2019 Base Plans:*** N/A ***FY 2019 OCO Plans:*** N/A	0.346 -	0.000 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	0.346	10.854	9.882	0.000	9.882

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The MK 15 Close-In Weapons System (CIWS) is a fast reaction, rapid fire, computer controlled radar system utilizing either a 20mm gun (Phalanx) or a SeaRAM weapon system (SeaRAM) to meet its primary mission of providing Anti-Ship Missile (ASM) defense. Funding provides support for efforts related to Technology Refresh

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 9081 / *Phalanx CIWS SEARAM*

(for current fleet population) as well as efforts related to the integration/installation of SeaRAM CIWS in DDG 64, 71, 75, and 78. This work will be completed via sole source contracts to the CIWS Design Agent (Raytheon Missile Systems). Tech Refresh improvements will be fielded as Engineering Change Proposals (ECPs) and will be installed during CIWS overhauls or pierside.

E. Performance Metrics

Successfully complete trade studies and initial requirements definition for Technology Refresh and efforts related to successful integration/installation of SeaRAM CIWS in DDG class ships.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 9081 / *Phalanx CIWS SEARAM*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CIWS Tech Refresh	SS/CPFF	Raytheon Missile Systems : Tucson, AZ	4.435	0.000		0.000		0.000		-		0.000	0.000	4.435	4.435
SeaRAM CIWS on DDG Class	SS/CPFF	Raytheon Missile Systems: : Various	1.963	0.346	Mar 2017	0.000		0.000		-		0.000	0.000	2.309	-
CIWS Tech Refresh	Various	Various : Various	0.400	0.000		10.854	Apr 2018	9.882	Jan 2019	-		9.882	Continuing	Continuing	Continuing
		Subtotal	6.798	0.346		10.854		9.882		-		9.882	Continuing	Continuing	N/A

Remarks

CIWS Tech Refresh modernization activities are focused on redesign of key subsystems, some of which date to the 1970s with obsolete and largely unsupportable electronics systems. Replacing these subsystems with modular "refreshed" components will reduce total ownership costs and maintenance requirements for the overall sustainment of the Phalanx system.

	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.798	0.346		10.854		9.882		-		9.882	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 9081 / *Phalanx CIWS SEARAM*

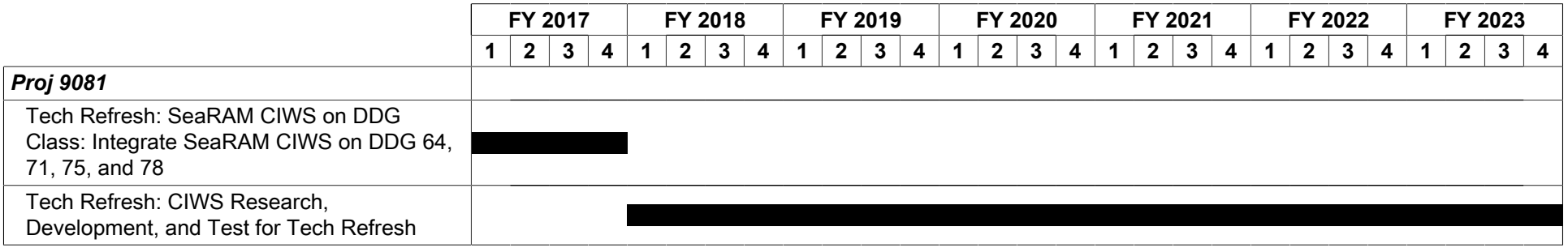

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 9081 / *Phalanx CIWS SEARAM*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9081				
Tech Refresh: SeaRAM CIWS on DDG Class: Integrate SeaRAM CIWS on DDG 64, 71, 75, and 78	1	2017	4	2017
Tech Refresh: CIWS Research, Development, and Test for Tech Refresh	1	2018	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
9999: *Congressional Adds*	3.072	4.836	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.908
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MK 15 Close-In Weapons System (CIWS) is a fast reaction, rapid fire, computer controlled radar system utilizing either a 20mm gun (Phalanx) or a SeaRAM weapon system (SeaRAM) to meet its primary mission of providing Anti-Ship Missile (ASM) defense. CIWS fleet population exceeds 220 systems onboard nearly every USN surface combatant. In addition, CIWS continues to be installed on new construction surface ships with life expectancies of 25+ years. Basic system architecture is 20+ years old, hasn't had a significant R&D development effort since the 1990's, and is in need of Technology Refresh in order to avoid hardware obsolescence, maintain/improve reliability, increase capability, and provide affordable spare parts to achieve acceptable Operational Availability for the next 20+ years. Technology Refresh development starts in FY 2018 under Project 9081 and will be fielded during CIWS overhauls and will consist of three efforts: Electric Gun Drive System (EGDS), Electronics Enclosure Modernization (ELX), and Local Control Station and Remote Control Station (LCS/RCS) Redesign. EGDS will replace the current pneumatic gun drive system that is difficult and costly to maintain with an all-electric drive system. EGDS will reduce maintenance/troubleshooting requirements, reduce support costs, and provide capability increases such as variable firing rates and reduced ammunition expenditures. ELX replaces costly and obsolete 1970's technology circuit card assemblies, servo controllers and electronic drawer backplanes with COTS digital devices, integrated controllers, and efficient power converters. ELX also will provide a reduction in weight of approx 960 lbs and simplified maintainability. LCS/RCS Redesign eliminates expensive obsolete components, decreases maintenance requirements and complexity, increases commonality between the LCS and RCS via open architecture, and simplifies the user operation by reducing Human Machine Interface requirements.

Congressional funds of $4.836M received in FY17 for CIWS Tech Refresh for Electronics Enclosure Modernization

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018
Congressional Add: Electronics Enclosure Redesign Efforts	4.836	0.000
FY 2017 Accomplishments: Kick off CIWS Tech Refresh efforts for Electronics Enclosure Modernization		
FY 2018 Plans: Conduct trade studies and requirements generation which will culminate in Systems Requirements Review.		
Congressional Adds Subtotals	4.836	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 9999 / *Congressional Adds*

D. Acquisition Strategy

The MK 15 Close-In Weapons System (CIWS) is a fast reaction, rapid fire, computer controlled radar system utilizing either a 20mm gun (Phalanx) or a SeaRAM weapon system (SeaRAM) to meet its primary mission of providing Anti-Ship Missile (ASM) defense. Funding provides support for efforts related to Technology Refresh (for current fleet population) as well as efforts related to the integration/installation of SeaRAM CIWS in DDG 64, 71, 75, and 78. This work will be completed via sole source contracts to the CIWS Design Agent (Raytheon Missile Systems). Tech Refresh improvements will be fielded as Engineering Change Proposals (ECPs) and will be installed during CIWS overhauls or pierside.

E. Performance Metrics

Successfully complete trade studies and initial requirements definition for Technology Refresh and efforts related to successful integration/installation of SeaRAM CIWS in DDG class ships.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CIWS Electronics Enclosure Redesign	SS/CPFF	Raytheon Missile Systems : Tucson, AZ	3.072	4.836	Aug 2017	0.000		0.000		-		0.000	0.000	7.908	-
		Subtotal	3.072	4.836		0.000		0.000		-		0.000	0.000	7.908	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.072	4.836		0.000		0.000		-		0.000	0.000	7.908	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 9999 / *Congressional Adds*

	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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 9999																												
CIWS Tech Refresh: CIWS Research, Development, and Test for Tech Refresh					[redacted]																							

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604756N / *Ship Self Def (Engage: Hard Kill)*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
CIWS Tech Refresh: CIWS Research, Development, and Test for Tech Refresh	4	2017	2	2018