Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604112N *I (U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	51.527	95.408	70.528	83.935	-	83.935	84.195	57.668	27.503	28.009	Continuing	Continuing
2208: *CVN 21*	40.211	34.938	32.843	57.946	-	57.946	68.152	57.668	27.503	28.009	Continuing	Continuing
4004: *EMALS*	11.316	12.195	37.685	25.989	-	25.989	16.043	0.000	0.000	0.000	0.000	103.228
9999: *Congressional Adds*	0.000	48.275	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	48.275

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 223

A. Mission Description and Budget Item Justification

This Navy program addresses unique technologies on Ford Class carriers. The program includes:

- (2208) - Development of ship hull, mechanical, propulsion, electrical, aviation, and combat support systems, subsystems and components to significantly improve aircraft carrier affordability, manpower requirements, survivability, and operational capabilities, and to meet the requirements of existing and pending regulations and statutes critical to the operation of existing and future aircraft carriers.

- (4004) - Development of an advanced technology aircraft launch system in support of the CVN 78 Class design and construction schedule. The Electro Magnetic Aircraft Launch System (EMALS) will replace the current steam catapult on CVN 78 Class ships. EMALS provides better control of applied forces, both peak and transient dynamic, improved
reliability and maintainability, increased operational availability and reduced operator and maintainer workload.

- (C275) - Planning for the Full Ship Shock Trial for the USS Gerald Ford (CVN 78) in accordance with the Acquisition
Decision Memorandum (ADM) dated 7 August 2015.

This Program Element (PE) and associated projects represent a continuation of efforts previously funded under PE 0603512N projects 2208 and 4004 in FY 2014 and earlier.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604112N *I (U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	98.105	70.528	96.339	-	96.339
Current President's Budget	95.408	70.528	83.935	-	83.935
Total Adjustments	-2.697	0.000	-12.404	-	-12.404
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.697	0.000			
• Program Adjustments	0.000	0.000	-13.175	-	-13.175
• Rate/Misc Adjustments	0.000	0.000	0.771	-	0.771

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *CVN-78 Shock Trials*	48.275	0.000
Congressional Add Subtotals for Project: 9999	48.275	0.000
Congressional Add Totals for all Projects	48.275	0.000

Change Summary Explanation

2208 - FY 18 Operational Test & Evaluation funding reduced by $13.175 due to schedule shift in IOT&E and OT-C1 to 1Q 2021

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 2208 / *CVN 21*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
2208: *CVN 21*	40.211	34.938	32.843	57.946	-	57.946	68.152	57.668	27.503	28.009	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 223

A. Mission Description and Budget Item Justification

This project provides for the development of aircraft carrier specific technologies, the infusion of the ship technology base into existing and future aircraft carriers, and the potential realization of subsystem design capabilities not currently feasible. This project transitions the most promising technologies from the Navy technology base, other government laboratories, and the private sector into specific advanced development efforts. All systems developed in this project have the potential to support emerging requirements and other promising systems technologies for insertion into new aircraft carrier designs. The emphasis is directed toward developing ship hull, mechanical, propulsion, electrical, aviation, warfare systems, and combat support systems, sub-systems and components to significantly improve aircraft carrier affordability, manpower requirements, survivability, and operational
capabilities and to meet the requirements of existing and pending regulations and statutes critical to the operation of future aircraft carriers. This project also encompasses those tasks required to support CVN 78 procurement, including, but not limited to engineering support, programmatic and program support, logistics support, modeling and simulation, test and evaluation, manpower and program related studies, and design support systems, such as the Integrated Digital Environment (IDE).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: CVN 78 Class Advanced Technology Design & Development	23.505	7.455	31.374	0.000	31.374
Articles:	-	-	-	-	-
Description: CVN 78 Class Advanced Technology Design & Development - Continue development and transition of technologies to support CVN 78 Class Key Performance Parameters (KPPs): maintain sortie generation rate, reductions in manpower, and further recovery of weight and stability service life margins. Continue design activities to integrate the new technologies, such as the new propulsion plant and Electromagnetic Aircraft Launch System into the ship. Complete shock qualification for components of all CVN 78 systems.					
FY 2016 Accomplishments: Continued transition of key technologies to support CVN 21 (CVN 78 Class) KPPs. Continued design activities to integrate new technologies into the ship. Continued to assess ship impacts and implemented changes to the Class design. Continued existing studies and commenced new studies required for integrated warfare system and C4I design, integration, test, and validation efforts. Continued review of Pre-Planned Product Improvement					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
(P3I) technical data packages. Continued CVN 78 Class engineering and technical support of aircraft launch and recovery systems. Continued shipbuilder system and cost engineering support to assess ship impacts from selected ECRs and changes to the GFE / CFE equipment split. Planned and executed the acceptance and transition of CVN 78 CFE systems to Navy In-Service and Life Cycle Management. Identified and implemented cost reduction measures for the CVN 78 Class. ***FY 2017 Plans:*** Complete design activities to integrate new technologies into the ship. Complete existing studies required for integrated warfare system and C4I design, integration, test, and validation efforts. Continue CVN 78 class engineering and technical support of aircraft launch and recovery systems, along with providing support to resolve issues identified during shakedown and Post-Shakedown Availability (PSA) on CVN 78 developmental systems. Conduct cyber-security tasks to include elimination of all Windows XP operating system usage to reduce cyber-security vulnerabilities and the completion of Information Technology system Interim Authority to Operate (IATO) remedial actions in order to achieve full Authority to Operate (ATO) certification and accreditation. ***FY 2018 Base Plans:*** Cyber-security: Continue developing CVN 78 cyber-security processes, requirements and solutions. Establish boundary defense for tactical, wire-free communication and video systems. Develop and maintain certification and accreditation packages for system support. Develop land-based test sites to conduct testing. Component Shock: Complete CVN 78 GFE component / system shock qualification requirements. This effort will allow necessary NAVSEA post-delivery shock hardening certification of CVN 78 prior to its operational deployment and complete prerequisite testing for the CVN 78 Class FSST on CVN 78. The increase from FY2017 to FY2018 is due to the requirement for component shock qualification testing. Raytheon will be performing shock qualification testing of Dual Band Radar (DBR). NSWC Philadelphia will have an increased workload with significant shock test report review, test procedure review and test preparation assistance. SPAWAR is continuing its shock test efforts, with all testing to be completed by 4Q2018. Major systems to be component shock qualified are Navy Multiband Terminal (NMT), Digital Modular Radio (DMR), Tactical Variant Switch (TVS), Consolidated Afloat Network Enterprise Services (CANES) Video, Radio Communication System (RCS), Automated Digital Network System (ADNS), and Communications Data Link					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
System (CDLS). There are also increasing requirements from Integrated Warfare Systems that are required for Ship's Self Defense System (SSDS) and Guided Missile Launching System (GMLS) for qualification. ***FY 2018 OCO Plans:*** N/A					
Title: CVN 21 - Test & Evaluation (T&E)	11.433	25.388	26.572	0.000	26.572
Articles:	-	-	-	-	-
FY 2016 Accomplishments: Updated the Test and Evaluation Master Plan (TEMP) 1610, Revision C. Continued holding the tri-annual Post Delivery Tests and Trials (PDT&T) workshops and updating / maintaining the notional PDT&T schedule. Continued the Developmental Test Working Group (DTWG) efforts, focusing on the collection / analysis of the Developmental Test (DT) metrics. Continued CVN 78 Integrated Test Team (CITT) efforts to coordinate Integrated Testing (IT) to achieve synergies among DT&E, OT&E, and LFT&E. Continued Developmental Test / Integrated Test Phase 4 (DT/IT-4). Completed Operational Test Phase B4 (OT-B4). ***FY 2017 Plans:*** Continue PDT&T, DTWG and CITT planning efforts in support of DT/IT-4 completion and post-PSA DT/IT-5 integration testing and preparations for Initial Operational Test and Evaluation (IOT&E). DT/IT-4 test events include: (1) Combat Systems Shipboard Developmental Testing (CS SBDT); (2) cyber-security inspections and aircraft compatibility testing; (3) Special Performance Trials and Acoustic Trials; and (4) continuing development of the Sea-strike Sea-basing Aviation Model (SSAM) and data collection in support of model validation. DT/IT-5 events include: (1) obtaining post-PSA Platform (Afloat Site) IATO / ATO and post-PSA flight deck certification; (2) continuing to conduct CS SBDT, Radar Cross Section and Infrared measurements, degaussing and de-perming, cyber-security inspections and aircraft compatibility testing; and (3) Combat System Ship Qualification Trial (CSSQT). ***FY 2018 Base Plans:*** Continue PDT&T, DTWG and CITT efforts in support of DT/IT-4 completion. Perform oversight of FY 18 PDT&T and DT/IT-4 test event integration to address DT and OT requirements. Major FY 18 PDT&T and DT/IT-4 test events include: (1) continued CS SBDT efforts; (2) continued cyber-security inspections and aircraft compatibility testing; (3) continued Special Performance Trials and Acoustic Trials and (4) completion of the development of the SSAM and data collection in support of model validation.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Continue PDT&T, DTWG, and CITT planning efforts in support of post-PSA DT/IT-5 integration testing and preparations for IOT&E. Major post-PSA DT/IT-5 test events include: (1) obtaining post-PSA Platform (Afloat Site) IATO / ATO and post-PSA flight deck certification; (2) continuing to conduct CS SBDT, Radar Cross Section and Infrared measurements, degaussing and de-perming, cyber-security inspections, and aircraft compatibility testing; and (3) continuing to conduct CSSQT. Continue planning for a CVN 78 Full Ship Shock Trial (FSST) to be conducted in FY19. Continue developing the CVN 78 FSST Plan. Continue the Modeling & Simulation (M&S) effort supporting the CVN 78 FSST pre-trial predictions. Continue planning to mitigate potential environmental impacts. Begin working with support activities to coordinate transport and storage of explosive charges. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	34.938	32.843	57.946	0.000	57.946

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN / 0604567N: *Project Units 3108, 3179, 4007*	18.151	50.920	54.131	-	54.131	51.235	47.338	46.024	46.918	Continuing	Continuing
• SCN / 2001: *Carrier Replacement Program*	2,431.929	2,662.567	4,461.772	-	4,461.772	1,576.966	2,234.571	2,966.013	2,351.884	2,326.440	38,479.270
• SCN / 5300: *Completion of Prior Year Shipbuilding Programs*	123.760	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	0.000	1,394.860
• OMN / 1B2B: *CVN 78 Ford Class Training and Sustainment (12BJ0)*	25.534	14.111	14.099	-	14.099	9.422	8.398	6.580	7.165	Continuing	Continuing
• OPN / 5664: *Surface Training Equipment*	0.000	4.733	12.010	-	12.010	8.039	1.006	5.034	3.024	0.000	33.846
• OMN / 1B1B: *Mission and Other Ship Operations (11B20)*	0.000	21.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.000

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

The CVN 78 is the first ship of the CVN 78 Class of aircraft carriers designed to replace USS ENTERPRISE and the ships of the NIMITZ Class. The CVN 78 will feature a new nuclear propulsion and electrical generation/distribution system, EMALS, advanced arresting gear (AAG) system, all electric auxiliaries, warfare system improvements, survivability
enhancements, improved weapons handling, and improved aircraft servicing. These design features will result in lower manpower and total ownership costs as compared to the NIMITZ Class. Additionally, the following war fighting benefits will be realized: increased sortie generation rate, improved ship self-defense capability, increased launch and recovery
capability/flexibility, increased operational availability, and increased flexibility to support future upgrades.

E. Performance Metrics

Successfully complete development of TEMP 1610, Rev C and route for signature. Successfully complete all PEO C4I Test Integration Facility (TIF) testing. Successfully execute Sortie Generation Rate Assessment (SGRA) 12 and SGRA 13. Successfully conduct and support feasibility and tradeoff studies and data packages on new and modified shipboard systems, technologies and proposed modification. Data packages shall include information to support program decisions to integrate these efforts into the whole ship design efforts. Successfully conduct IDC shock testing and reporting in order to finalize IDC R&D efforts. Successfully complete Advanced Weapons Elevator Shock and Electromagnetic Interference (EMI) Test qualifications. Successfully complete Plasma Arc Waste Destruction System (PAWDS) Land-Based Test. Successfully create and deliver 21 Decision Memorandums (DM) for Bents/Bays 1-21 on the 03 Level (Gallery Deck) with Layer 31 information. Successfully develop the baseline Technical Data Packages for 39 systems and mature packages in preparation for final GFI arrival.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Design & Development	C/CPAF	HII : VA	2.128	0.617	Nov 2015	1.821	Nov 2016	2.825	Nov 2017	-		2.825	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NSWC CARDEROCK : MD	1.837	1.046	Oct 2015	1.109	Oct 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NAWC PATUXENT RIVER : MD	1.894	1.999	Oct 2015	1.188	Oct 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NSWC DAHLGREN : VA	2.732	1.520	Oct 2015	0.515	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	C/CPAF	RAYTHEON : VA	4.814	3.239	Oct 2015	1.188	Dec 2016	10.100	Nov 2017	-		10.100	Continuing	Continuing	Continuing
Advanced Design & Development	C/CPFF	NAVSEA SEAPORT : DC	5.315	7.849	Dec 2015	1.386	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	Various	MISCELLANEOUS : VARIOUS	0.924	2.716	Oct 2015	0.248	Nov 2016	7.538	Nov 2017	-		7.538	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NSWC PHILADELPHIA : PA	5.928	3.591	Nov 2015	0.000		4.543	Nov 2017	-		4.543	Continuing	Continuing	Continuing
Advanced Design & Development	WR	SPAWAR : CA	0.619	0.559	Oct 2015	0.000		6.368	Nov 2017	-		6.368	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NSWC CORONA : CA	0.820	0.369	Nov 2015	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Advanced Design & Development	WR	NAWC LAKEHURST : NJ	5.204	0.000		0.000		0.000		-		0.000	0.000	5.204	-
		Subtotal	32.215	23.505		7.455		31.374		-		31.374	-	-	-

Remarks

The increase from FY2017 to FY2018 is due to the requirement for component shock qualification testing.
-Raytheon will be performing shock qualification testing of Dual Band Radar (DBR).
-NSWC Philadelphia will have an increased workload with significant shock test report review, test procedure review and test preparation assistance.
-SPAWAR is continuing its shock test efforts, with all testing to be completed by 4Q2018.
-Major systems to be component shock qualified are Navy Multiband Terminal (NMT), Digital Modular Radio (DMR), Tactical Variant Switch (TVS), Consolidated Afloat Network Enterprise Services (CANES) Video, Radio Communication System (RCS), Automated Digital Network System (ADNS), and Communications Data Link System (CDLS). There are also increasing requirements from Integrated Warfare Systems that are required for Ship's Self Defense System (SSDS) and Guided Missile Launching System (GMLS) for qualification.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 2208 / *CVN 21*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Test & Evaluation	C/CPAF	HII : VA	2.197	0.559	Nov 2015	0.842	Nov 2016	1.338	Nov 2017	-		1.338	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NAWC PATUXENT RIVER : MD	1.064	0.678	Nov 2015	3.878	Oct 2016	1.576	Nov 2017	-		1.576	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NSWC DAHLGREN : VA	2.431	3.115	Oct 2015	3.911	Oct 2016	5.034	Nov 2017	-		5.034	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NSWC CARDEROCK : MD	0.000	0.176	May 2016	0.597	Oct 2016	6.048	Nov 2017	-		6.048	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	SPAWAR : CA	0.000	0.120	Dec 2015	0.696	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Development Test & Evaluation	C/CPAF	RAYTHEON : VA	0.525	1.533	Jan 2016	1.716	Dec 2016	1.475	Dec 2017	-		1.475	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	SSC ATLANTIC : SC	0.025	0.000		0.832	Nov 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Development Test & Evaluation	Various	MISCELLANEOUS : VARIOUS	0.045	0.056	Oct 2015	0.346	Dec 2016	4.681	Dec 2017	-		4.681	Continuing	Continuing	Continuing
Development Test & Evaluation	C/CPFF	NAVSEA SEAPORT : DC	0.255	0.361	Jan 2016	0.000		1.100	Nov 2017	-		1.100	Continuing	Continuing	Continuing
Development Test & Evaluation	C/BA	NSWC PORT HUENEME : CA	0.000	0.182	Dec 2015	0.590	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Development Test & Evaluation	C/BA	NSWC CORONA : CA	0.000	0.182	Oct 2015	1.436	Dec 2016	0.000		-		0.000	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NAWC LAKEHURST : NJ	0.000	1.143	Nov 2015	0.000		1.680	Nov 2017	-		1.680	Continuing	Continuing	Continuing
Development Test & Evaluation	WR	NSWC PHILADELPHIA : PA	0.000	0.000		0.000		1.200	Nov 2017	-		1.200	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	COMOPTEVFOR : VA	1.454	3.190	Nov 2015	10.544	Dec 2016	2.440	Nov 2017	-		2.440	Continuing	Continuing	Continuing
Operational Test & Evaluation	WR	NAWC PATUXENT RIVER : MD	0.000	0.138	Feb 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	7.996	11.433		25.388		26.572		-		26.572	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 2208 / *CVN 21*	

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	40.211	34.938		32.843		57.946		-		57.946	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

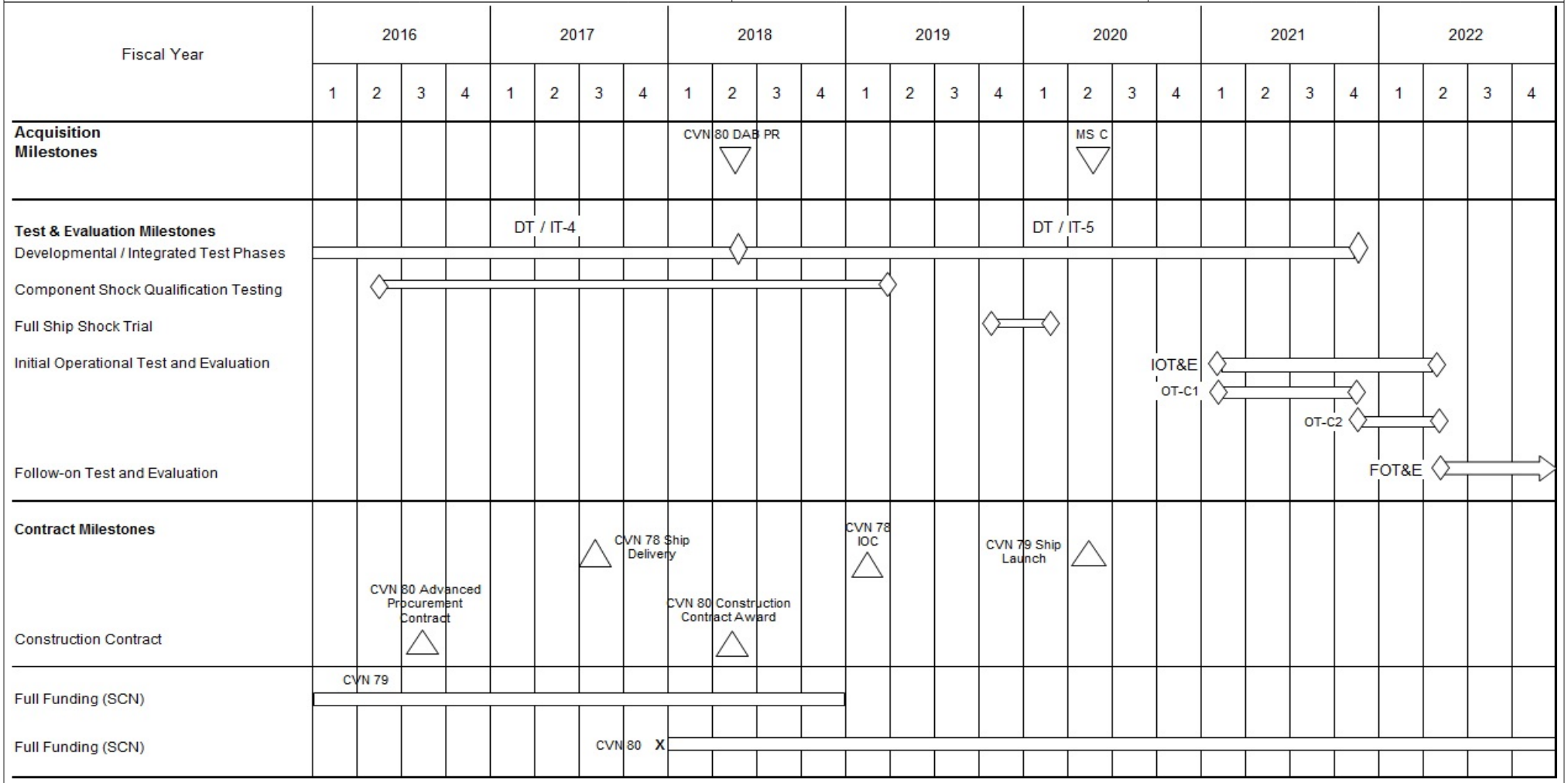

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 2208 / *CVN 21*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2208				
CVN 80 DAB PR	2	2018	2	2018
Milestone C	2	2020	2	2020
DT/IT -4- Developmental Test / Integrated Test Phase 4	1	2016	2	2018
DT/IT -5- Developmental Test / Integrated Test Phase 5	2	2018	4	2021
Component Shock Qualification Testing	2	2016	1	2019
Full Ship Shock Trial	4	2019	1	2020
Initial Operational Test & Evaluation	1	2021	2	2022
OT -C1 - Initial Operational Test & Evaluation - Phase C1	1	2021	4	2021
OT -C2 - Initial Operational Test & Evaluation - Phase C2	4	2021	2	2022
FOT&E - Follow-On Test & Evaluation	2	2022	4	2022
CVN 78 Ship Delivery	3	2017	3	2017
CVN 78 Initial Operational Capability (IOC)	1	2019	1	2019
CVN 80 Advanced Procurement Contract Award	3	2016	3	2016
CVN 80 Construction Contract Award	2	2018	2	2018
CVN 79 SCN Full Funding	1	2016	4	2018
CVN 79 Ship Launch	2	2020	2	2020
CVN 80 SCN Full Funding	1	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 4004 / *EMALS*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
4004: *EMALS*	11.316	12.195	37.685	25.989	-	25.989	16.043	0.000	0.000	0.000	0.000	103.228
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 223

A. Mission Description and Budget Item Justification

This project provides for the development of an advanced technology aircraft launch system in support of the CVN 78 design and construction schedule, as well as Engineering and Life Cycle System (E&LCS) design. The Electromagnetic Aircraft Launch System (EMALS) will be the aircraft catapult for CVN 78 Class ships. EMALS provides better control of applied forces, both peak and transient dynamic, improved reliability and maintainability, increased operational availability, and reduced operator and maintainer workload.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: EMALS	12.195	37.685	25.989	0.000	25.989
Articles:	-	-	-	-	-
Description: EMALS					
FY 2016 Accomplishments: (1) EMALS BOA ILS Order - Continued the execution of the EMALS ILS Development Program. Conducted annual logistics reviews, training IPR and O & I level Interactive Electronic Technical Manual (IETM) final system level IPR. Delivered the final EMALS O & I level IETM. Procured and delivered remaining quantity of Portable Electronic Maintenance Aids (PEMAs) to the CVN 78 for IETM use. Completed the Reliability Centered Maintenance (RCM) process and the development of Maintenance Requirement Cards (MRCs) and Quality Assurance (QA) cards. (2) EMALS BOA Integrated Test & Evaluation (IT&E) Order - Maintained EMALS shore-based test site to support engineering investigations, software integration, deficiency resolution, component obsolescence, and cyber security vulnerability. Conducted EMALS land-based testing using deadloads and aircraft for the correction of deficiencies, critical reliability growth to achieve fleet operational requirements and to maintain test unit cycles above shipboard cycles. Conducted Environmental Qualification Testing (EQT) for Launch Control Subsystem (LCS) components deferred from					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
SDD. ***FY 2017 Plans:*** Conduct EMALS Integrated Test & Evaluation (IT&E) land-based testing using deadloads and aircraft for the correction of deficiencies, critical reliability growth to achieve fleet operational requirements and to maintain test unit cycles above shipboard cycles. Conduct Environmental Qualification Testing (EQT) for Launch Control Subsystem (LCS) components deferred from System Development & Demonstration (SDD) and shock testing. Maintain EMALS shore-based test site to support: engineering investigations, software integration, deficiency resolution, component obsolescence regression test, and cyber security assessment/mitigation. Continue developing formal curriculum for fleet operations and maintenance training and schoolhouse training systems for future Ford class carrier crews. Provide interim training for crews until formal curriculum is completed and approved. ***FY 2018 Base Plans:*** Continue EMALS Integrated Test & Evaluation (IT&E) land-based testing using deadloads and aircraft for the correction of deficiencies, critical reliability growth to achieve fleet operational requirements and to maintain test unit cycles above shipboard cycles. Conduct Environmental Qualification Testing (EQT) for Launch Control Subsystem (LCS) components deferred from System Development & Demonstration (SDD) and shock testing. Maintain EMALS shore-based test site to support: engineering investigations, software integration, deficiency resolution, component obsolescence regression test, and cyber security assessment/mitigation. Continue developing formal curriculum for fleet operations and maintenance training and schoolhouse training systems for future Ford class carrier crews. Provide interim training for crews until formal curriculum is completed and approved. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	12.195	37.685	25.989	0.000	25.989

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN / 0604567N: *Project Units 3108, 3179, 4007*	18.151	50.920	54.131	-	54.131	51.235	47.338	46.024	46.918	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• SCN / 2001: *Carrier Replacement Program*	2,431.929	2,662.567	4,461.772	-	4,461.772	1,576.966	2,234.571	2,966.013	2,351.884	2,326.440	38,479.270
• SCN / 5300: *Completion of Prior Year Shipbuilding Programs*	123.760	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	0.000	1,394.860
• OMN / 1B2B: *CVN 78 Ford Class Training and Sustainment (12BJ0)*	25.534	14.111	14.099	-	14.099	9.422	8.398	6.580	7.165	Continuing	Continuing
• OPN / 5664: *Surface Training Equipment*	0.000	4.733	12.010	-	12.010	8.039	1.006	5.034	3.024	0.000	33.846
• OPN / 4213: *Aircraft Support Equipment*	87.643	82.179	63.695	-	63.695	65.105	77.503	73.937	74.562	Continuing	Continuing
• OMN / 1B1B: *Mission and Other Ship Operations (11B20)*	0.000	21.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.000

Remarks

OPN 4213 includes a portion of line item funding for Electro Magnetic Aircraft Launch System (EMALS).

D. Acquisition Strategy

The CVN 78 is the first ship of the CVN 78 Class of aircraft carriers designed to replace USS ENTERPRISE and the ships of the NIMITZ Class. The CVN 78 will feature a new nuclear propulsion and electrical generation/distribution system, new electromagnetic aircraft launching system (EMALS), advanced arresting gear (AAG) system, all electric auxiliaries, warfare system improvements, survivability enhancements, improved weapons handling, and improved aircraft servicing. These design features will result in lower manpower and total ownership costs as compared to the NIMITZ Class. Additionally, the following war fighting benefits will be realized: increased sortie generation rate, improved ship self-defense capability, increased launch and recovery capability/flexibility, increased operational availability, and increased flexibility to support future upgrades.

E. Performance Metrics

Successfully complete System Functional Demonstration (SFD) testing. Successfully complete Environmental Qualification Testing (EQT). Successfully complete Shipset Controls Lab testing. Successfully complete Integrated Test and Evaluation (IT&E) including Environmental Qualification Testing (EQT), correction of deficiencies, reliability growth and shock testing.

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Aircraft Launch, Recovery & Support	C/CPAF	General Atomics (SDD) : CA	2.000	0.000		0.000		0.000		-		0.000	0.000	2.000	-
Aircraft Launch, Recovery & Support	C/CPFF	General Atomics (ILS BOA) : CA	7.949	9.071	Nov 2015	0.000		0.000		-		0.000	0.000	17.020	-
Primary HW Development	C/CPFF	General Atomics : CA	0.000	0.000		23.568	Nov 2016	15.637	Nov 2017	-		15.637	14.669	53.874	53.874
Training Development	WR	NAWCTSD Orlando : FL	0.000	0.000		9.200	May 2017	7.500	Nov 2017	-		7.500	0.000	16.700	-
		Subtotal	9.949	9.071		32.768		23.137		-		23.137	14.669	89.594	-

Remarks

Primary HW Development to General Atomics (GA) supports Integrated Test & Evaluation efforts which covers previously deferred shock testing, environmental qualification testing and correction of deficiency of launch control subsystem hardware.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Aircraft Launch, Recovery & Support	WR	NAWC Lakehurst : NJ	1.367	2.597	Oct 2015	0.000		0.000		-		0.000	0.000	3.964	-
Integrated Test & Evaluation	WR	NAWC Lakehurst : NJ	0.000	0.000		4.917	Nov 2016	2.852	Nov 2017	-		2.852	1.374	9.143	-
Aircraft Launch, Recovery & Support	WR	NSWC Philadelphia : PA	0.000	0.412	Apr 2016	0.000		0.000		-		0.000	0.000	0.412	-
Aircraft Launch, Recovery & Support	WR	NSWC Dahlgren : VA	0.000	0.115	May 2016	0.000		0.000		-		0.000	0.000	0.115	-
		Subtotal	1.367	3.124		4.917		2.852		-		2.852	1.374	13.634	-

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	11.316	12.195		37.685		25.989		-		25.989	16.043	103.228	-

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 4004 / *EMALS*	

	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

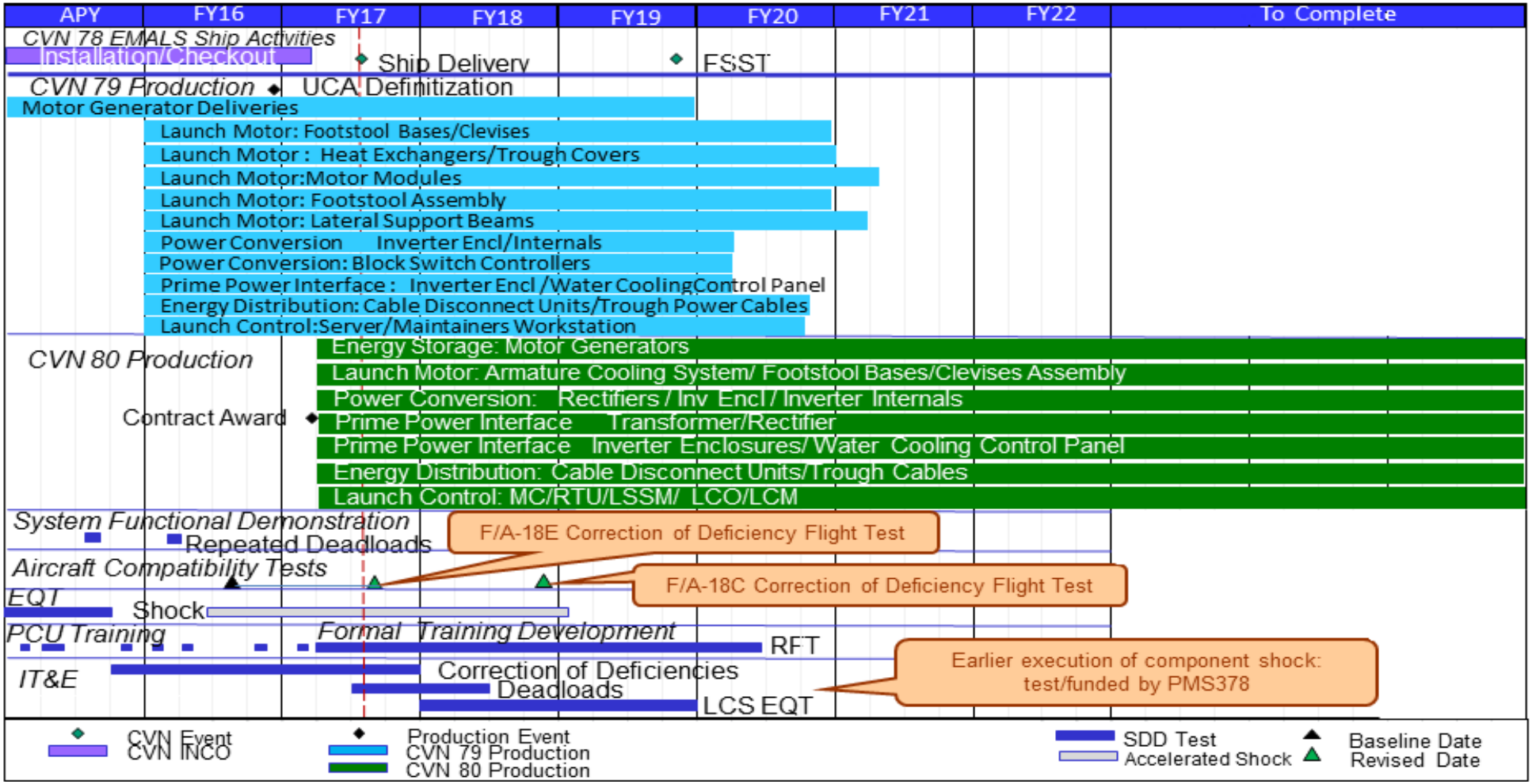

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 4004 / *EMALS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 4004				
CVN 80 DAB PR	2	2018	2	2018
Milestone C	1	2018	1	2018
EMALS SDD Complete	4	2018	4	2018
EMALS Integrated Test & Evaluation (IT&E)	1	2016	1	2020
DT/IT -4- Developmental Test / Integrated Test Phase 4	1	2016	3	2017
DT/IT -5- Developmental Test / Integrated Test Phase 5	3	2017	2	2019
Component Shock Qualification Testing	2	2016	4	2018
Full Ship Shock Trial	3	2019	4	2019
Initial Operational Test & Evaluation	4	2018	3	2021
OT -C1 - Initial Operational Test & Evaluation - Phase C1	4	2018	3	2019
OT -C2 - Initial Operational Test & Evaluation - Phase C2	1	2020	3	2021
FOT&E - Follow-On Test & Evaluation	3	2021	4	2022
CVN 78 Ship Delivery	3	2017	3	2017
CVN 78 Initial Operational Capability (IOC)	1	2018	1	2018
CVN 80 Advanced Procurement Contract Award	3	2016	3	2016
CVN 80 Construction Contract Award	2	2018	2	2018
CVN 79 SCN Full Funding	1	2016	4	2018
CVN 79 Ship Launch	2	2020	2	2020
CVN 80 SCN Full Funding	1	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	48.275	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	48.275
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides for planning for the Full Ship Shock Trial for the USS Gerald Ford (CVN 78).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: CVN-78 Shock Trials	48.275	0.000
FY 2016 Accomplishments: Began planning for CVN 78 Class Shock Trial on CVN 78 in accordance with the Acquisition Decision Memorandum (ADM) dated 7 August 2015.		
FY 2017 Plans: N/A		
Congressional Adds Subtotals	48.275	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDTEN / 0604567N: *Project Units 3108, 3179, 4007*	18.151	50.920	54.131	-	54.131	51.235	47.338	46.024	46.918	Continuing	Continuing
• SCN / 2001: *Carrier Replacement Program*	2,555.689	2,662.567	4,461.772	-	4,461.772	1,576.966	2,234.571	2,966.013	2,351.884	2,326.440	38,603.030
• SCN / 5300: *Completion of Prior Year Shipbuilding Programs*	123.760	0.000	20.000	-	20.000	0.000	0.000	0.000	0.000	0.000	1,394.860
• OMN / 1B2B: *CVN 78 Ford Class Training and Sustainment (12BJ0)*	25.534	14.111	14.099	-	14.099	9.422	8.398	6.580	7.165	Continuing	Continuing
• OPN / 5664: *Surface Training Equipment*	0.000	4.733	12.010	-	12.010	8.039	1.006	5.034	3.024	0.000	33.846
• OMN / 1B1B: *Mission and Other Ship Operations*	0.000	21.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.000

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604112N / *(U)Gerald R Ford Cl Nuc Aircraft Carrier CVN 78-80*	**Project (Number/Name)** 9999 / *Congressional Adds*

D. Acquisition Strategy

The CVN 78 is the first ship of the CVN 78 Class of aircraft carriers designed to replace USS ENTERPRISE and the ships of the NIMITZ Class. The CVN 78 will feature a new nuclear propulsion and electrical generation/distribution system, new electromagnetic aircraft launching system (EMALS), advanced arresting gear (AAG) system, all electric auxiliaries, warfare system improvements, survivability enhancements, improved weapons handling, and improved aircraft servicing. These design features will result in lower manpower and total ownership costs as compared to the NIMITZ Class. Additionally, the following war fighting benefits will be realized: increased sortie generation rate, improved ship self-defense capability, increased launch and recovery capability/flexibility, increased operational availability, and increased flexibility to support future upgrades.

E. Performance Metrics

Successfully accomplish pre-Shock Trial planning and preparations in support of the CVN 78 Class Full Ship Shock Trial in accordance with the Acquisition Decision Memorandum of 7 August 2015.