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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy **Date:** March 2023

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604112N / <i>GERALD R FORD CI NUC AIRCRAFT CARRIER CVN 78-80</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	584.157	117.878	116.498	118.182	-	118.182	78.504	95.504	106.139	55.900	Continuing	Continuing
2208: <i>CVN 21</i>	442.157	105.904	99.243	117.401	-	117.401	68.992	81.980	93.337	55.900	Continuing	Continuing
4004: <i>EMALS</i>	142.000	11.974	17.255	0.781	-	0.781	9.512	13.524	12.802	0.000	0.000	207.848

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.

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.

Project Unit (PU) 2208 now includes PUs 3179, 3108 and 4007 in FY 2024 and later, which are a continuation of efforts previously funded under Program Element (PE) 0604567N. Navy consolidated all Ford Class project units into one program element for improved transparency of all R&D efforts associated with the CVN 78 Class.

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B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	121.509	116.498	45.574	-	45.574
Current President's Budget	117.878	116.498	118.182	-	118.182
Total Adjustments	-3.631	0.000	72.608	-	72.608
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.631	0.000			
• Program Adjustments	0.000	0.000	71.901	-	71.901
• Rate/Misc Adjustments	0.000	0.000	0.707	-	0.707

Change Summary Explanation

2208 CVN 21 Cost:

FY24 PROJ PU 2208: Addition of PUs 3179, 3108 and 4007 in FY 2024 and later from PE 0604567N (+\$40.1M)

FY24 PROJ PU 2208: Added additional funds for Integrated Digital Shipbuilding (iDS) (+\$20.0M)

FY24 PROJ PU 2208: Added additional funds for CVN 78 Class Developmental Testing (DT) / Operational Testing (OT) (+\$15.3M)

4004 EMALS

Cost: Program adjustments (-\$1.9M)

Technical: N/A

Schedule:

Integrated Test & Evaluation (IT&E) end date moved from 1Q FY2022 to 2Q FY2022 to complete the top system safety issue for EMALS Block Switch Sensor (BSS), which was identified during CVN78 Post Delivery Test & Trials (PDT&T).

Phased Depot Standup (Component & Overhaul) moved from Development to Sustainment.

Depot Planning/Logistics Dev end date moved from 3Q 2023 to 1Q 2024 to include Depot Overhaul Capability efforts.

Added Automated Software Testing in 1Q FY2024 through 4Q FY2026.

Added Electrical Isolation Development starting 1Q FY2025 through 4Q FY2027.

CVN 79 events were updated to reflect the most current Post Delivery Test & Trials (PDT&T) ship schedule.

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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / GERALD R FORD CI NUC AIRCRAFT CARRIER CVN 78-80	Project (Number/Name) 2208 / CVN 21
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
2208: CVN 21	442.157	105.904	99.243	117.401	-	117.401	68.992	81.980	93.337	55.900	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 223

Note
 Project Unit (PU) 2208 now includes PUs 3179, 3108, and 4007 in FY 2024 and later, which are a continuation of efforts previously funded under Program Element (PE) 0604567N.
 FY 2023 R2A Category "CVN 21 - Test and Evaluation (T&E)" has been renamed to "CVN 78 Class Test & Evaluation (T&E)."
 FY 2023 R2A Category "Integrated Digital Shipbuilding (iDS)" has been renamed to "CVN 78 Class Digital Transformation."

A. Mission Description and Budget Item Justification

This project provides 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. All systems developed in this project support current or emerging requirements and other promising systems technologies for insertion into existing and new aircraft carrier designs. The emphasis is directed toward developing ship hull, mechanical, propulsion, electrical, aviation, and warfare systems to significantly improve aircraft carrier affordability, manpower requirements, survivability, and operational capabilities required to meet 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 Class 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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: CVN 78 Class Digital Transformation	53.000	86.243	46.247	0.000	46.247
Articles:	-	-	-	-	-
Description: CVN 78 Class Digital Transformation - to develop, refine, and implement digital structures such as the FORD class product model, Integrated Digital Shipbuilding (iDS), and cloud based product exchanges.					
FY 2023 Plans: Continue CVN 80/81 FY23 Integrated Digital Shipbuilding implementation plan and execute the installment plan of the total contract by the Navy. These efforts are directly tied to the construction trade products needed to support the build sequence in the shops and on the waterfront. Failure to fully fund installment clause would result in a change to the contract as funding requirements would not be met. HII-NNS will continue to apply upgrades to their Product Lifecycle Management (PLM) toolsets, Product Data Management (PDM)					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
<p>methodology, and other resource planning software in order to support developing toolset integration, new business processes, and overall shipbuilding efficiency increase. Continue to support engineering efforts to define and add product manufacturing information into the Product Model to allow design disclosure to the Navy and digital disclosure of work instructions and related technical references on tablet computers for the trades to use in the construction of CVN 80/81. Continue planning efforts to develop visual work instructions for manufacturing and constructions Trades. Continue to develop visual build management plans and Critical Chain Project Plans (CCPP) that will enable development of efficiently sequenced build plans.</p> <p>FY 2024 Base Plans: Continue CVN 80/81 FY24 Integrated Digital Shipbuilding (iDS) implementation plan and execute the installment schedule per the contract. This effort will enable HII-NNS to achieve 2-ship-buy savings and drive the modernization of the shipbuilding base. iDS Products are directly tied to construction needs and are issued to the individual trades which utilize them on the deckplate to support the CVN 80/81 build on the waterfront. Failure to fully fund installment clause would result in a change to the contract as funding requirements would not be met. HII-NNS is continually looking at ways to increase efficiency of developing iDS products through upgrades to their Product Lifecycle Management (PLM) toolsets, Model Based Enterprise methodology, and other resource planning software.</p> <p>FY 2024 OCO Plans: N/A</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: The decrease in FY 2024 supports the contractual installments with the shipbuilder.</p>					
<p>Title: CVN 78 Class Test & Evaluation (T&E)</p> <p align="right">Articles:</p> <p>Description: Test and Evaluation includes test planning, system modeling and simulation, incorporating laboratory and land based facilities support, conducting test events, and evaluating and documenting test results. Title 10, US Code, Section 2366 also requires survivability assessment; for the CVN 78 Class this entails testing, analysis, and documentation. T&E results in refinement of future FORD Class capabilities and survivability, system analysis, verification and validation of requirements, and fulfilling statutory requirements.</p> <p>FY 2023 Plans: Conclude Consolidated Test Working Group (CTWG), and Carrier Integrated Test Team (CITT) efforts upon completion of the final phase of Developmental Testing (DT/IT-5). Conduct the first phase of Operational</p>	37.904	13.000	24.967	0.000	24.967
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
Testing (OT-C1). OT-C1 test events include lab-based cyber survivability testing, interoperability data collection, and collection of OT data. Begin planning to support the Sortie Generation Rate demonstration event. Continue to collect reliability data on new and legacy systems. Continue to monitor corrective actions and track installation and performance on ship.					
FY 2024 Base Plans: Finalize Operational Testing (OT) on CVN 78. Conduct platform combat systems testing against high-speed surface targets. Plan and execute CVN 78 platform cyber survivability test event. Continue reliability, availability, and maintainability (RAM) studies on CVN 78 class. Complete Total Ship Survivability Trial (TSST) Reporting to assess and improve ship systems recoverability against simulated damage from realistic threats. Complete survivability modeling improvements, analyses and documentation and the final Survivability Analysis Report (SAR). Continue to collect reliability data on new and legacy systems.					
FY 2024 OCO Plans: N/A					
FY 2023 to FY 2024 Increase/Decrease Statement: The increase in FY 2024 is due to the consolidation of the Live Fire Test & Evaluation (LFT&E) Project Unit 4007 from PE 0604567N. Additionally, FY 2024 funding is needed to execute Operational Test events and the Total Ship Survivability Trial on CVN 78.					
Title: CVN 78 Class Transformation and Affordability					
Articles:					
Description: Investments in technology insertion to assist in stabilizing the supply chain, reducing the cost of production, improving industrial capacity, increasing supplier throughput, reducing schedule risk, improving material quality and performance specifications. These investments provide opportunities to incorporate affordability into the design, engineering, manufacturing and overhead of future Aircraft Carriers.					
FY 2023 Plans: N/A					
FY 2024 Base Plans: Provide support for cyber related penetration testing for shipboard systems. Support for topside activities. Design and development of new Land Based Testing Facility (LBTF) to support Programmable Logic Controllers (PLCs)					
	0.000	0.000	14.362	0.000	14.362
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)						
for propulsion system monitoring. Development of cost saving initiatives, process improvements, business case analyses, and design for affordability initiatives to continue to drive affordability into the carrier program.						
FY 2024 OCO Plans: N/A						
FY 2023 to FY 2024 Increase/Decrease Statement: The increase is due to the consolidation of efforts previously funded under PU 3108 PE 0604567N along with new FY 2024 specific tasking: cyber penetration efforts, topside activity support, and design and development of new LBTF to support PLC's for propulsion system monitoring.						
Title: CVN 78 Class Systems Analysis & Total Ship Integration						
Articles:						
		0.000	0.000	31.825	0.000	31.825
		-	-	-	-	-
Description: Integrate mission systems into platform design, while also addressing fact-of-life configuration changes from obsolescence, advances in technology, late and/or poor quality material, and other adverse program impacts to mitigate cost, schedule or performance risk. This includes divestments in legacy technologies and materials, which offset forward pricing rates in procurement, and feasibility and tradeoff studies that enhance naval capability and reduce total ownership cost.						
FY 2023 Plans: N/A						
FY 2024 Base Plans: Continue to perform technical analysis and engineering calculations in support of validating Technical Performance Measures (TPMs), System/Component, Environmental Safety and Health Qualification, and Human Factors Engineering, Ship/System/Component Survivability and Vulnerability Qualification, System/Component Shock and Vibration Qualification, and other miscellaneous system related calculations. Continue to address design and construction issues, and technically resolve class system integration issues based on the results of CVN 78 testing and initial operations. Refine system integration and testing strategies for implementation testing by evaluating improvements needed to capitalize on CVN 78 lessons learned. Manage and resolve fact-of-life obsolescence changes on government-furnished equipment and contractor-furnished equipment systems to support construction. Continue conducting and supporting feasibility and tradeoff studies on new and modified shipboard systems and equipment.						
FY 2024 OCO Plans:						

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
N/A					
FY 2023 to FY 2024 Increase/Decrease Statement: The increase is due to the consolidation of efforts previously funded under PU 3108 and PU 3179 from PE 0604567N, along with an increase to conduct software analysis and compatibility studies, complete FORD Class component shock qualification program, and perform design and feasibility studies related to configuration changes.					
Title: CVN 78 Full Ship Shock Trial (FSST) Articles:	12.000 -	0.000 -	0.000 -	0.000 -	0.000 -
Description: No efforts for FSST are required after FY22.					
FY 2023 Plans: N/A					
FY 2024 Base Plans: N/A					
FY 2024 OCO Plans: N/A					
Title: CVN 78 Class Advanced Technology Design & Development Articles:	3.000 -	0.000 -	0.000 -	0.000 -	0.000 -
Description: No efforts for CVN 78 Class Advanced Technology Design & Development are required after FY22.					
FY 2023 Plans: N/A					
FY 2024 Base Plans: N/A					
FY 2024 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	105.904	99.243	117.401	0.000	117.401

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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u> <u>Base</u>	<u>FY 2024</u> <u>OCO</u>	<u>FY 2024</u> <u>Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RD TEN / 0604567N: <i>Project Units 3108, 3179, 4007</i>	42.563	45.717	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	572.789
• SCN / 2001: <i>Carrier Replacement Program</i>	1,062.205	1,465.880	1,115.296	-	1,115.296	2,416.717	1,159.211	1,842.376	2,119.562	Continuing	Continuing
• SCN / 2004: <i>CVN 81</i>	1,287.719	1,052.024	800.492	-	800.492	666.045	1,922.144	2,011.766	1,724.982	0.000	12,929.104
• SCN / 5300: <i>Completion of PY Shipbldg Progr</i>	291.000	461.700	624.600	-	624.600	0.000	0.000	0.000	0.000	0.000	1,377.300
• OPN / 5664: <i>Surface Training Equipment</i>	2.475	2.468	2.430	-	2.430	2.497	2.664	2.722	2.780	Continuing	Continuing
• OMN / 1B2B: <i>CVN 78 Ford Class Training and Sustainment</i>	5.176	5.601	6.064	-	6.064	6.167	6.245	6.281	6.253	Continuing	Continuing
• OMN / 1B5B: <i>Ford Class PCU Housing</i>	1.100	11.818	15.587	-	15.587	5.100	0.800	10.600	10.812	Continuing	Continuing

Remarks

D. Acquisition Strategy

The CVN 78 Class of aircraft carriers is designed to replace USS ENTERPRISE and the ships of the NIMITZ Class. The CVN 78 Class features a new nuclear propulsion and electrical generation/distribution system, Electro Magnetic Aircraft Launch 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.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy **Date:** March 2023

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Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Digital Shipbuilding	C/CPAF	HII : VA	93.965	53.000	Nov 2021	86.243	Nov 2022	46.247	Nov 2023	-		46.247	Continuing	Continuing	Continuing
Class Transformation and Affordability	Various	NSWC PHILADELPHIA : PA	0.000	0.000		0.000		10.150	Nov 2023	-		10.150	Continuing	Continuing	Continuing
Class Transformation and Affordability	Various	VARIOUS : VARIOUS	0.000	0.000		0.000		4.212	Nov 2023	-		4.212	Continuing	Continuing	Continuing
Systems Analysis & Total Ship Integration	C/CPFF	GRYPHON : DC	0.000	0.000		0.000		2.225	Nov 2023	-		2.225	Continuing	Continuing	Continuing
Systems Analysis & Total Ship Integration	WR	NAWC PATUXENT RIVER : MD	0.000	0.000		0.000		1.250	Nov 2023	-		1.250	Continuing	Continuing	Continuing
Systems Analysis & Total Ship Integration	C/CPFF	CACI : DC	0.000	0.000		0.000		5.500	Nov 2023	-		5.500	0.000	5.500	-
Systems Analysis & Total Ship Integration	C/CPAF	HII : VA	0.000	0.000		0.000		20.262	Nov 2023	-		20.262	Continuing	Continuing	Continuing
Systems Analysis & Total Ship Integration	Various	VARIOUS : VARIOUS	0.000	0.000		0.000		2.588	Nov 2023	-		2.588	Continuing	Continuing	Continuing
Advanced Design & Development	C/CPAF	HII : VA	32.266	0.230	Nov 2021	0.000		0.000		-		0.000	0.000	32.496	-
Advanced Design & Development	WR	NSWC DAHLGREN : VA	7.781	1.300	Nov 2021	0.000		0.000		-		0.000	0.000	9.081	-
Advanced Design & Development	WR	NSWC PHILADELPHIA : PA	22.495	1.120	Nov 2021	0.000		0.000		-		0.000	0.000	23.615	-
Advanced Design & Development	C/CPFF	GRYPHON : DC	0.352	0.350	Nov 2021	0.000		0.000		-		0.000	0.000	0.702	-
Prior Year AD&D No Longer Funded in the FYDP	Various	VARIOUS : VARIOUS	84.386	0.000		0.000		0.000		-		0.000	0.000	84.386	-
Subtotal			241.245	56.000		86.243		92.434		-		92.434	Continuing	Continuing	N/A

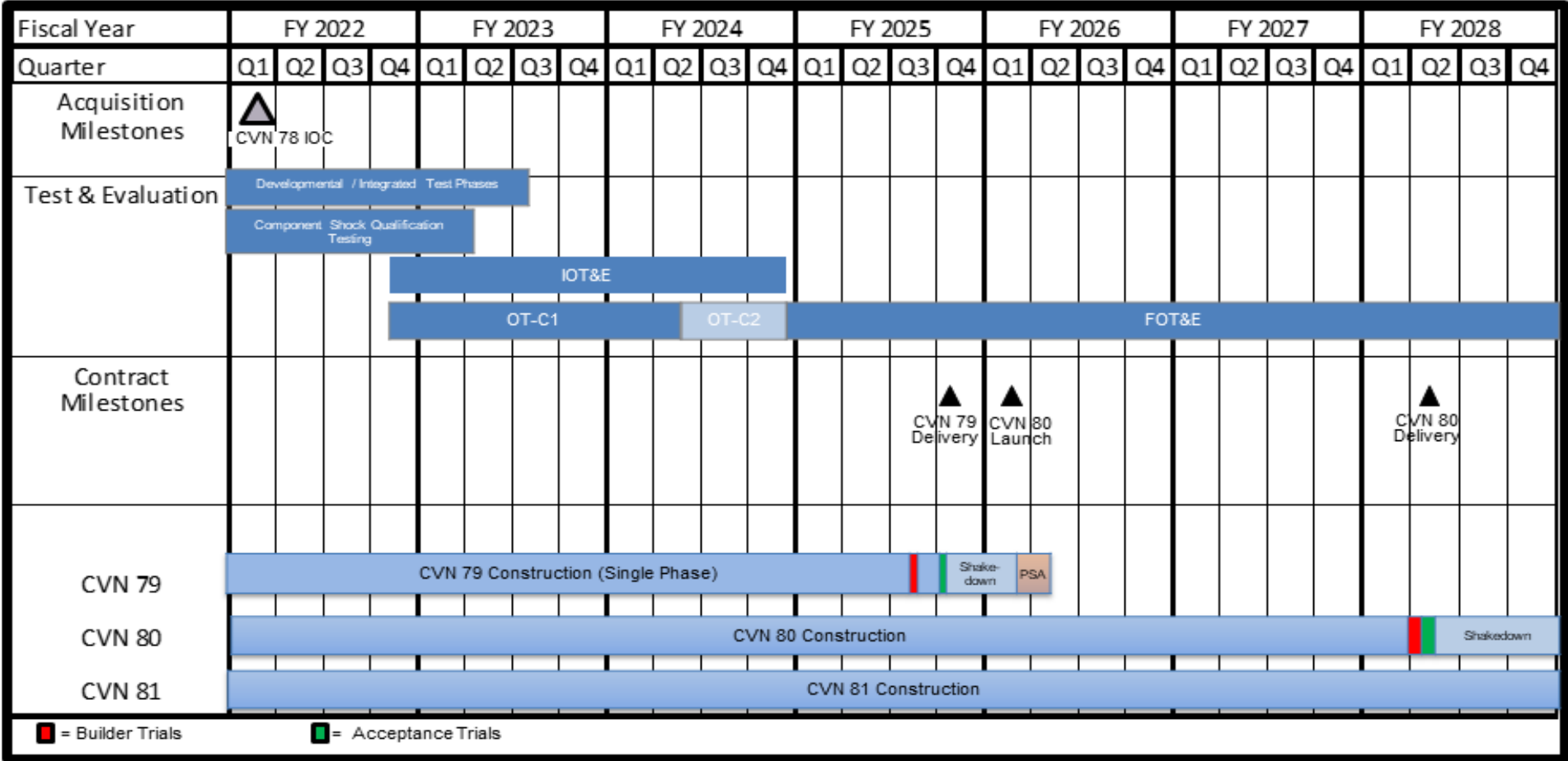
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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy												Date: March 2023			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 4				PE 0604112N / GERALD R FORD CI NUC AIRCRAFT CARRIER CVN 78-80				2208 / CVN 21							
Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation (DT&E)	C/CPAF	HII : VA	11.057	1.131	Nov 2021	0.000		0.000		-		0.000	0.000	12.188	-
Developmental Test & Evaluation (DT&E)	WR	NAWC PATUXENT RIVER : MD	4.153	0.174	Nov 2021	0.000		0.000		-		0.000	0.000	4.327	-
Developmental Test & Evaluation (DT&E)	WR	NSWC DAHLGREN : VA	15.067	3.742	Nov 2021	2.700	Nov 2022	4.792	Nov 2023	-		4.792	0.000	26.301	-
Developmental Test & Evaluation (DT&E)	WR	NSWC CARDEROCK : MD	2.481	1.166	Nov 2021	0.400	Nov 2022	0.000		-		0.000	0.000	4.047	-
Developmental Test & Evaluation (DT&E)	Various	MISCELLANEOUS : VARIOUS	5.848	2.385	Nov 2021	0.380	Nov 2022	2.510	Nov 2023	-		2.510	0.000	11.123	-
Developmental Test & Evaluation (DT&E)	C/BA	NSWC PORT HUENEME : CA	2.934	8.628	Nov 2021	0.000		0.000		-		0.000	0.000	11.562	-
Developmental Test & Evaluation (DT&E)	C/BA	NSWC CORONA : CA	0.263	0.592	Nov 2021	0.000		0.000		-		0.000	0.000	0.855	-
Developmental Test & Evaluation (DT&E)	WR	NAWC LAKEHURST : NJ	12.358	1.741	Nov 2021	1.300	Nov 2022	1.765	Nov 2023	-		1.765	0.000	17.164	-
Operational Test & Evaluation (OT&E)	WR	COMOPTEVFOR : VA	15.011	18.345	Nov 2021	5.400	Nov 2022	9.331	Nov 2023	-		9.331	Continuing	Continuing	Continuing
Operational Test & Evaluation (OT&E)	WR	NAWC PATUXENT RIVER : MD	0.213	0.000		0.400	Nov 2022	0.000		-		0.000	Continuing	Continuing	Continuing
Operational Test & Evaluation (OT&E)	Various	MISCELLANEOUS : VARIOUS	0.000	0.000		0.500	Nov 2022	0.895	Nov 2023	-		0.895	Continuing	Continuing	Continuing
Operational Test & Evaluation (OT&E)	WR	NSWC PHILADELPHIA : PA	0.000	0.000		1.120	Nov 2022	0.000		-		0.000	Continuing	Continuing	Continuing
Operational Test & Evaluation (OT&E)	C/CPFF	GRYPHON : DC	0.000	0.000		0.300	Nov 2022	0.000		-		0.000	Continuing	Continuing	Continuing
Operational Test & Evaluation (OT&E)	WR	NSWC CORONA : CA	0.000	0.000		0.500	Nov 2022	0.000		-		0.000	Continuing	Continuing	Continuing
Live Fire Test & Evaluation (LFT&E)	Various	MISCELLANEOUS : VARIOUS	0.000	0.000		0.000		2.559	Nov 2023	-		2.559	Continuing	Continuing	Continuing
Live Fire Test & Evaluation (LFT&E)	C/CPFF	BECHTEL : PA	9.132	0.400	Nov 2021	0.000		0.000		-		0.000	0.000	9.532	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
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Gerald R. Ford Class Carriers



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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 2208				
CVN 21	1	2022	4	2028

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy **Date:** March 2023

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604112N / GERALD R FORD CI NUC AIRCRAFT CARRIER CVN 78-80	Project (Number/Name) 4004 / EMALS
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
4004: EMALS	142.000	11.974	17.255	0.781	-	0.781	9.512	13.524	12.802	0.000	0.000	207.848
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.

The EMALS program will undergo future development efforts for system improvements. Automated software testing development provides for rapid, repeatable tests, resulting in higher quality software. Automated testing enables rapid diagnosis of system faults and decrease troubleshooting response time for the fleet. EMALS is a software intensive system and highly dependent on reliable software operation. The readiness and mission benefits include the ability to provide the fleet with affordable, quality, well-tested software capable of launching and recovering aircraft on Ford-Class carriers.

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

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: EMALS	11.974	17.255	0.781	0.000	0.781
Articles:	-	-	-	-	-
Description: EMALS					
FY 2023 Plans: Complete Ready for Training. Complete depot planning and analysis for component repairs, and perform logistics development for depot overhaul capability and high failure component repair validation.					
FY 2024 Base Plans: Begin Primary Software Development for Automated Software Testing.					
FY 2024 OCO Plans: N/A					
FY 2023 to FY 2024 Increase/Decrease Statement:					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Decrease from FY 2023 to FY 2024 due to the completion of EMALS Depot logistics and training efforts.					
Accomplishments/Planned Programs Subtotals	11.974	17.255	0.781	0.000	0.781

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024 Base</u>	<u>FY 2024 OCO</u>	<u>FY 2024 Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RD TEN / 0604567N: Project Units 3108, 3179, 4007	42.563	45.717	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• SCN / 2001: Carrier Replacement Program	1,062.205	1,465.880	1,115.296	-	1,115.296	2,416.717	1,159.211	1,842.376	2,119.562	Continuing	Continuing
• OMN / 1B2B: CVN 78 Ford Class Training and Sustainment (12BJ0)	5.176	5.601	6.064	-	6.064	6.167	6.245	6.281	6.253	Continuing	Continuing
• OPN / 5664: Surface Training Equipment	2.475	2.468	2.430	-	2.430	2.497	2.664	2.722	2.780	Continuing	Continuing
• OPN / 4213: Aircraft Support Equipment	176.387	272.044	162.273	-	162.273	117.925	97.652	97.973	98.420	Continuing	Continuing
• SCN / 2004: CVN 81	1,287.719	1,052.024	800.492	-	800.492	666.045	1,922.144	2,011.766	1,724.982	0.000	12,929.104
• SCN / 5300: Completion of PY Shipbldg Progr	291.000	461.700	624.600	-	624.600	0.000	0.000	0.000	0.000	0.000	1,377.300
• OMN / 1B5B: Ford Class PCU Housing	1.100	11.818	15.587	-	15.587	5.100	0.806	10.600	10.812	Continuing	Continuing
• OPN/4219: Electromagnetic Aircraft Launch System (EMALS)	0.000	18.594	17.836	-	17.836	20.958	21.211	20.614	20.700	44.265	164.178

Remarks

OPN 4213 includes a portion of line item funding for EMALS through FY23.

D. Acquisition Strategy

The CVN 78 is the first ship of the CVN 78 Class of aircraft carriers designed to replace 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

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generation rate, improved ship self-defense capability, increased launch and recovery capability/flexibility, increased operational availability, and increased flexibility to support future upgrades.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy **Date:** March 2023

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Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Prior Year Cost No Longer Funded in FYDP	Various	Various : Various	72.826	0.000		0.000		0.000		-		0.000	0.000	72.826	24.589
Primary SW Development - Automated Software Testing	WR	NAWCAD Lakehurst : Lakehurst, NJ	0.000	0.000		0.000		0.781	Nov 2023	-		0.781	1.488	2.269	-
Subtotal			72.826	0.000		0.000		0.781		-		0.781	1.488	75.095	N/A

Remarks
FY 2024 Primary SW Dev increase is to begin development of Automated Software Testing capability.

Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Training Support	WR	NAWCAD TSD : Orlando, FL	1.281	0.196	Nov 2021	0.000		0.000		-		0.000	0.000	1.477	-
Depot Logistics Development	C/CPFF	General Atomics : San Diego, CA	18.319	6.021	Nov 2021	2.440	Nov 2022	0.000		-		0.000	0.000	26.780	25.231
Government Eng Support	WR	NAWCAD Lakehurst : Lakehurst, NJ	3.275	1.646	Nov 2021	2.413	Nov 2022	0.000		-		0.000	0.000	7.334	-
Depot Logistics Development (Overhaul Capability)	C/CPFF	General Atomics : San Diego, CA	0.000	4.111	Apr 2022	11.313	Nov 2022	0.000		-		0.000	0.000	15.424	-
Training Support	C/FFP	General Atomics : San Diego, CA	0.000	0.000		0.367	Nov 2022	0.000		-		0.000	0.000	0.367	-
Training Support	WR	NAWCAD Lakehurst : Lakehurst, NJ	0.000	0.000		0.722	Nov 2022	0.000		-		0.000	0.000	0.722	-
Prior Year Cost No Longer Funded in FYDP	Various	Not Specified : Not Specified	1.319	0.000		0.000		0.000		-		0.000	0.000	1.319	-
Subtotal			24.194	11.974		17.255		0.000		-		0.000	0.000	53.423	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy **Date:** March 2023

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Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
Decrease from FY 2023 to FY 2024 due to the completion of EMALS Depot logistics and training efforts.

Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Prior Year Developmental Test & Evaluation Not Funded FYDP (PYDT&E)	Various	Various : Various	44.980	0.000		0.000		0.000		-		0.000	0.000	44.980	-
Subtotal			44.980	0.000		0.000		0.000		-		0.000	0.000	44.980	N/A

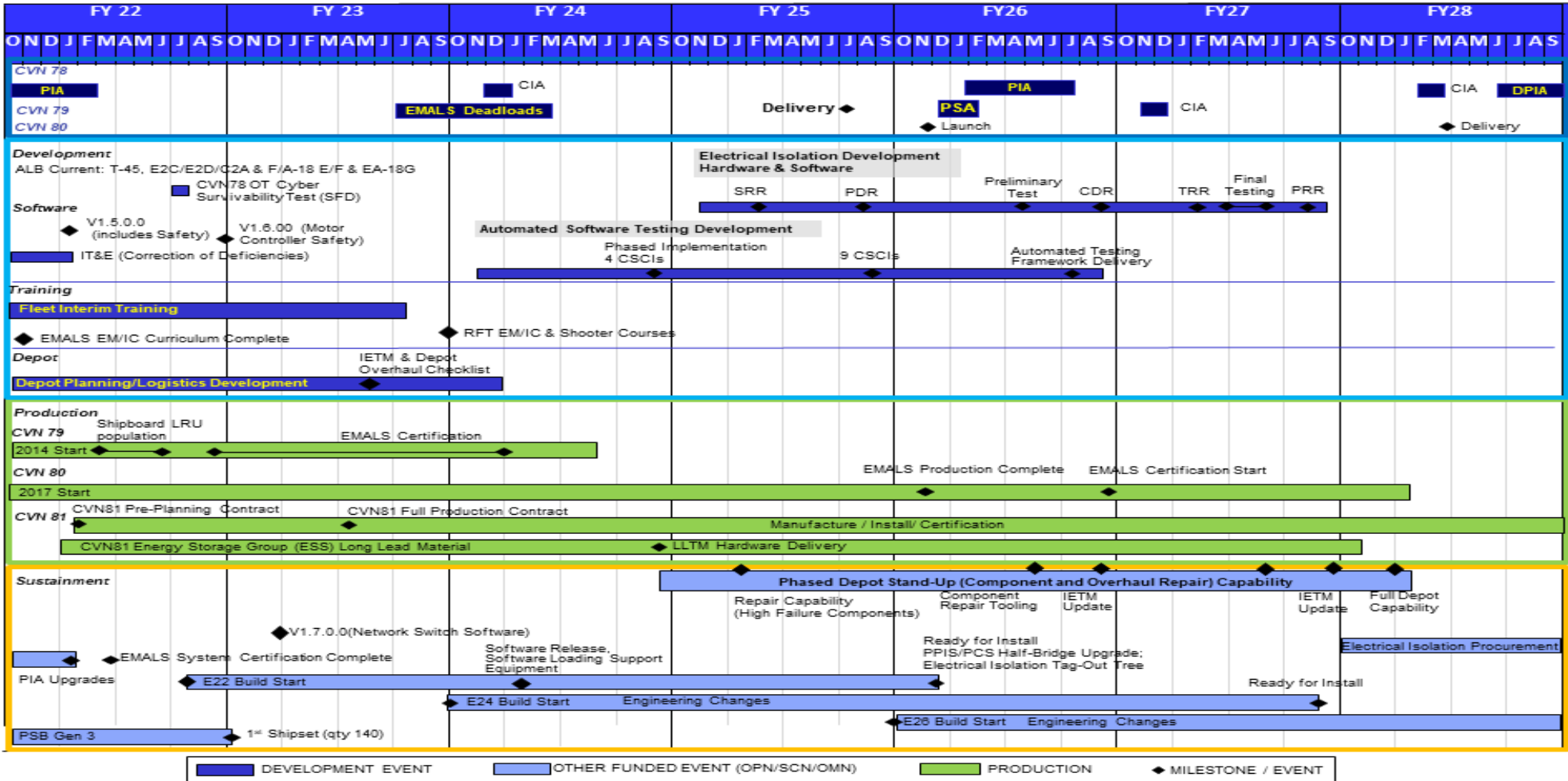
	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	142.000	11.974		17.255		0.781		-		0.781	1.488	173.498	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy Date: March 2023

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 4004				
Training: EMALS Interim Training	1	2022	4	2023
Depot Development: EMALS Depot Planning/Logistics Dev	1	2022	4	2023
Test and Evaluation: EMALS Integrated Test & Evaluation (IT&E)	1	2022	2	2022
Test and Evaluation: EMALS Automated SW Testing	1	2024	4	2026
Test and Evaluation: EMALS Electrical Isolation	1	2025	4	2027