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**Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy** **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	1,101.165	9.104	8.924	11.759	-	11.759	12.544	12.641	12.876	13.093	Continuing	Continuing
2232: <i>CV/CVN Launch and Recover</i>	1,093.443	7.173	8.924	11.759	-	11.759	12.544	12.641	12.876	13.093	Continuing	Continuing
9999: <i>Congressional Adds</i>	7.722	1.931	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.653

**A. Mission Description and Budget Item Justification**

CV Launch & Recover System - This Navy unique project addresses the System Development and Demonstration (SDD) of systems required to recover and launch Navy/Marine Corps Aircraft (Fixed/Rotary Wing and Vertical/Short Take Off and Landing) operating aboard aircraft carriers, amphibious assault ships, and air capable ships. This program element includes the following:

- (1) Aircraft Launch & Recovery Equipment Modernization
- (2) Aircraft Launch and Recovery Equipment Service Life Management program

This program is funded under SYSTEM DEVELOPMENT AND DEMONSTRATION because it includes those projects that have passed Milestone B approval and are conducting engineering and manufacturing development tasks aimed at meeting validated requirement prior to full-rate production decision.

<b>B. Program Change Summary (\$ in Millions)</b>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>
Previous President's Budget	11.593	8.924	0.000	-	0.000
Current President's Budget	9.104	8.924	11.759	-	11.759
Total Adjustments	-2.489	0.000	11.759	-	11.759
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.383	0.000			
• SBIR/STTR Transfer	-0.106	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	11.759	-	11.759

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<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>
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<b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Project:</b> 9999: <i>Congressional Adds</i>		
Congressional Add: <i>Fleet Strike Group Aviation Management</i>	1.931	0.000
Congressional Add Subtotals for Project: 9999	1.931	0.000
Congressional Add Totals for all Projects	1.931	0.000

**Change Summary Explanation**

Cost: AAG funding included under 0604512N in FY 2018 and prior. All costs FY 2019 and later are captured under PE: 0604530N, PU: 2367.

The increase from FY 2022 to FY 2023 is due to funding to support the ARC Block Upgrade test efforts.

Schedule: Updated to break out Advanced Recovery Control (ARC) milestones for additional clarity.

ALRE Modernization HW/SW Dev moved from 1Q FY 2021 to 4Q FY 2021.

Schedule updated to remove the FY 2019 Congressional Add C461: Improving Aircraft Carrier Readiness.

C558 ALRE SW Improvements SW Dev moved from 3Q FY2021 to 4Q FY2021.

C692 SW Dev moved from 2Q FY 2022 to 4Q FY 2022.

Technical: Added ARC accomplishments to FY 2022 plan for clarification.

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FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Navy										<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>				<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
2232: <i>CV/CVN Launch and Recover</i>	1,093.443	7.173	8.924	11.759	-	11.759	12.544	12.641	12.876	13.093	Continuing	Continuing
Quantity of RDT&E Articles		-	1	1	-	1	-	-	-	-		

**Note**

PY article includes Advanced Arresting Gear (AAG) Jet Car Track Site and two Improved Manually Operated Visual Landing Aid System (IMOVLAS) production representative models. Service Life Management Program (SLMP) test articles refer to actual units (two units per ship set).

**A. Mission Description and Budget Item Justification**

This Navy unique project addresses the System Development and Demonstration (SDD) of systems required to recover and launch Navy/Marine Corps Aircraft (Fixed/Rotary Wing and Vertical/Short Take-Off and Landing) operating aboard aircraft carriers (CVN), amphibious assault ships and air capable ships. This program includes the following systems under Project 2232, including the funding of production representative models for:

(1) Aircraft Launch & Recovery Equipment (ALRE) Modernization: ALRE Modernization encompasses efforts required to ensure continued functional performance, operational relevance, and cybersecurity accreditation for all product lines across the ALRE program. This includes efforts required to resolve emerging obsolescence issues (both hardware and software), implement fleet driven operational capability upgrades, and comply with cybersecurity requirements and computer task order requirements for security threat mitigation. Major categories include Visual Landing Aids (VLA), Information Systems, Launcher, Recovery and Aviation Data Management and Control System (ADMACS). There are 48 fielded subsystems that are included in the major categories.

(2) Aircraft Launch & Recovery Equipment (ALRE) Service Life Management Program (SLMP): The ALRE SLMP for Launcher and Recovery is required to sustain carrier aviation operations of higher energy aircraft launch and recoveries that are increasing loads on the ALRE systems, and that are affecting availability, maintainability and cost. This program will consist of service life assessment and extension initiatives and will establish the design foundation (structural, reliability, and maintainability analyses), permit appropriate assessment, track and focus design changes where most needed. Two SLMP prototypes were procured in FY 2018. The Nimitz class aircraft carriers operate Mark 7 arresting gear systems to capture and arrest Navy aircraft. The Mark 7 systems use a classic linear-piston cylinder setup to convert the kinetic energy of the aircraft into storage energy. Specifically a control system is used to apply correct logic to piston-cylinder closing parameters depending upon the aircraft type that is being arrested. This is called Advanced Recovery Control (ARC). The current ARC system was designed with early 2000's technology and components that have reached their end-of-life and are not compliant with current cybersecurity protocols. To support continued operations through 2060, a series of developmental engineering changes are required for modernized control components, technology and cybersecurity. This is the ARC Block Upgrade.

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

	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>
<b>Title:</b> Aircraft Launch & Recovery Equipment Modernization	0.742	0.727	0.099	0.000	0.099
<b>Articles:</b>	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Navy	<b>Date:</b> April 2022
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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p><b>Description:</b> ALRE Modernization encompasses efforts required to ensure continued functional performance, operational relevance, and cybersecurity accreditation for all product lines across the ALRE program. This includes efforts required to resolve emerging obsolescence issues (both hardware and software), implement fleet driven operational capability upgrades, and comply with cybersecurity requirements and computer task order requirements for security threat mitigation. Major categories include Visual Landing Aids (VLA), Information Systems, Launcher, Recovery and Aviation Data Management and Control System (ADMACS). There are 48 fielded subsystems that are included in the major categories.</p> <p><b>FY 2022 Plans:</b> Continues the developmental enhancements to resolve known and emerging capability shortfalls within the major categories of ALRE to include: VLA, Information Systems, Launcher, Recovery and ADMACS. These major subsystems include 48 fielded Aircraft Launch and Recovery Systems. These efforts support various Air Capable Ships, Amphibious Assault Ships, and Aircraft Carrier Fleet.</p> <p><b>FY 2023 Base Plans:</b> Continues the developmental enhancements to resolve known and emerging capability shortfalls within the major categories of ALRE to include: VLA, Information Systems, Launcher, Recovery and ADMACS. These major subsystems include 48 fielded Aircraft Launch and Recovery Systems. These efforts support various Air Capable Ships, Amphibious Assault Ships, and Aircraft Carrier Fleet.</p> <p><b>FY 2023 OCO Plans:</b> N/A</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> The decrease from FY 2022 to FY 2023 is due to current program plan.</p>					
<p><b>Title:</b> Aircraft Launch &amp; Recovery Equipment (ALRE) Service Life Management Program (SLMP)</p> <p align="right"><b>Articles:</b></p> <p><b>FY 2022 Plans:</b> Complete land-based testing of the Mk7 Main Engine Cylinder and begin land-based testing of the Replacement Purchase Cable prototypes. Continue analysis, design, development and testing of the Aircraft Ship Integrated Secure and Transfer (ASIST) components and subcomponents. Begin the Recovery Assist, Securing and Traversing (RAST) and Jet Blast Deflector (JBD) service life assessments. For the ARC Block Upgrade within Recovery critical analyses and detailed design will be completed and prototype manufacturing will be started.</p> <p><b>FY 2023 Base Plans:</b></p>	6.431	8.197	11.660	0.000	11.660
	-	1	1	-	1

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Navy	<b>Date:</b> April 2022
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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Complete ARC Block Upgrade prototype manufacturing and begin testing. Continue analyses and service life assessments on various ALRE systems.  <b>FY 2023 OCO Plans:</b> N/A  <b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> The increase from FY 2022 to FY 2023 is due to ARC Block Upgrade test efforts.					
<b>Accomplishments/Planned Programs Subtotals</b>	7.173	8.924	11.759	0.000	11.759

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPN/4213: <i>Aircraft Launch &amp; Recovery Equipment-Aircraft Launch &amp; Recovery Equipment</i>	236.655	175.439	275.461	-	275.461	134.713	133.408	128.740	132.767	Continuing	Continuing

**Remarks**  
OPN 4213 includes a portion of line item funding for ALRE.

**D. Acquisition Strategy**  
Aircraft Launch & Recovery Equipment Modernization: This program ensure continued functional performance, operational relevance, and cybersecurity accreditation for all product lines across the ALRE program. Programs include Visual Landing Aids (VLA), Information Systems, Launcher, Recovery and Aviation Data Management and Control System (ADMACS). There are 48 fielded subsystems that are included in the major categories.

Aircraft Launch & Recovery Equipment Service Life Management Program (SLMP): This program will consist of Service Life Assessment and Extension initiatives and will establish the design foundation (structural, reliability and maintainability analyses), permit appropriate assessment, track and focus design changes where most needed.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy** **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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<b>Product Development (\$ in Millions)</b>				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Primary HW Dev - ALRE Mod	WR	NAWCAD : Lakehurst, NJ	1.703	0.742	Nov 2020	0.727	Nov 2021	0.099	Nov 2022	-		0.099	Continuing	Continuing	Continuing
Primary HW Dev-SLMP	WR	NAWCAD : Lakehurst, NJ	20.232	2.931	Nov 2020	0.735	Nov 2021	8.240	Nov 2022	-		8.240	Continuing	Continuing	Continuing
Prior Year Cost No Longer Funded in FYDP	Various	Various : Various	904.203	0.000		0.000		0.000		-		0.000	0.000	904.203	-
<b>Subtotal</b>			926.138	3.673		1.462		8.339		-		8.339	Continuing	Continuing	N/A

**Remarks**  
The increase from FY 2022 to FY 2023 is to complete ARC Block Upgrade prototype.

<b>Support (\$ in Millions)</b>				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Studies & Analysis-SLMP	WR	NAWCAD : Lakehurst, NJ	24.285	3.159	Nov 2020	4.225	Nov 2021	0.122	Nov 2022	-		0.122	Continuing	Continuing	Continuing
Prior Year Cost No Longer Funded in FYDP	Various	Various : Various	27.231	0.000		0.000		0.000		-		0.000	0.000	27.231	-
Government Engineering Support	WR	NAWCAD : Lakehurst, NJ	0.000	0.000		0.000		0.099	Nov 2022	-		0.099	Continuing	Continuing	Continuing
<b>Subtotal</b>			51.516	3.159		4.225		0.221		-		0.221	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Materials/Validation Testing-SLMP	WR	NAWCAD : Lakehurst, NJ	23.560	0.341	Nov 2020	3.237	Nov 2021	3.199	Nov 2022	-		3.199	Continuing	Continuing	Continuing
Prior Year Cost No Longer Funded in FYDP	Various	Various : Various	88.996	0.000		0.000		0.000		-		0.000	0.000	88.996	-
<b>Subtotal</b>			112.556	0.341		3.237		3.199		-		3.199	Continuing	Continuing	N/A



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**Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy** **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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	2021				2022				2023				2024				2025				2026				2027			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>ALRE Service Life Management Program (SLMP)</b>																												
System Development: Hardware/Software Development :HW/SW Development																												
ARC Block Upgrade Development																												
ARC Block Upgrade Prototype																												
System Development: Hardware/Software Development :System Development																												
Test & Evaluation: Technical Evaluation: Test & Evaluation																												
ARC Block Upgrade Testing																												
<b>ALRE Modernization</b>																												
Systems Development: Hardware/Software Development: Obsolescence Redesign Development and Testing																												

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**Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy** **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>ALRE SERVICE LIFE MANAGEMENT PROGRAM (SLMP)</i></b>				
Systems Development: ARC Block Upgrade Development	4	2021	1	2023
Systems Development: ARC Block Upgrade Prototype	4	2022	4	2023
Hardware/Software Development: HW/SW Development	1	2021	4	2027
Hardware/Software Development: System Development	1	2021	4	2027
Test & Evaluation: Technical Evaluation: Test & Evaluation	1	2021	4	2027
Test & Evaluation: Technical Evaluation: ARC Block Upgrade Testing	1	2024	2	2026
<b><i>ALRE MODERNIZATION</i></b>				
Systems Development: Hardware/Software Development: Obsolescence Redesign Development and Testing	4	2021	4	2027

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Navy										<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>				<b>Project (Number/Name)</b> 9999 / <i>Congressional Adds</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
9999: <i>Congressional Adds</i>	7.722	1.931	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.653
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

Congressional Add. Program Increase to Improve Aircraft Carrier Readiness.

**A. Mission Description and Budget Item Justification**

Congressional Add. Program Increase to Improve Aircraft Carrier Readiness.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2021</b>	<b>FY 2022</b>
<b>Congressional Add:</b> Fleet Strike Group Aviation Management	1.931	0.000
<b>FY 2021 Accomplishments:</b> N/A		
<b>FY 2022 Plans:</b> N/A		
<b>Congressional Adds Subtotals</b>	1.931	0.000

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A



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**Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy** **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 9999 / <i>Congressional Adds</i>
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Proj 9999	FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
<b>C558: Aircraft Launch and Recovery Equipment Software Improvements</b>				Contract Award ◆																								
				Software Development																								
	Systems Support																											
<b>C692: Fleet Strike Group Aviation Management</b>								Contract Award ◆																				
								SW Development																				
							Systems Support																					

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2023 Navy **Date:** April 2022

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 9999 / <i>Congressional Adds</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 9999</b>				
C558: Aircraft Launch and Recovery Equipment Software Improvements: SW Development	4	2021	4	2021
C558: Aircraft Launch and Recovery Equipment Software Improvements: Software Development	4	2021	4	2022
C558: Aircraft Launch and Recovery Equipment Software Improvements: Systems Support	1	2021	4	2021
C692: Fleet Strike Group Aviation Management: SW Development	4	2022	4	2022
C692: Fleet Strike Group Aviation Management: Software Development	4	2022	4	2023
C692: Fleet Strike Group Aviation Management: Systems Support	3	2022	4	2022