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

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</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	142.874	22.579	49.312	66.010	-	66.010	111.464	134.312	135.890	138.146	Continuing	Continuing
1109: <i>CH/MH-53</i>	103.815	6.680	2.868	3.657	-	3.657	2.604	2.379	2.424	2.461	Continuing	Continuing
3406: <i>Attack and Utility Replacement Aircraft</i>	29.405	11.072	46.444	62.353	-	62.353	108.860	131.933	133.466	135.685	Continuing	Continuing
9999: <i>Congressional Adds</i>	9.654	4.827	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.481

A. Mission Description and Budget Item Justification

This Program Element includes funding for the development support for improvements to current systems for CH/MH-53 and development of USMC Vertical Take-Off and Landing (VTOL) Family of Systems (FoS) formerly Attack and Utility Replacement Aircraft (AURA) capability. The H-53 is the premier heavy lift helicopter for the Marine Corps and the only operational airborne mine sweeping platform for the Navy. H-53 RDT&E efforts focus on trade studies and risk reduction measures to identify candidate survivability, safety, avionics, cargo handling, cockpit and other airframe specific improvements to extend the service life. VTOL FoS is a USMC initiative to address vertical lift capability requirements and determine feasible and affordable solutions in support of the Warfighter.

B. Program Change Summary (\$ in Millions)

	<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	23.133	56.444	0.000	-	0.000
Current President's Budget	22.579	49.312	66.010	-	66.010
Total Adjustments	-0.554	-7.132	66.010	-	66.010
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.132			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.554	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	-	-	66.010	-	66.010

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

Project: 9999: *Congressional Adds*

Congressional Add: *CH-53E Health Usage Monitoring System*

FY 2021	FY 2022
4.827	0.000

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Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Congressional Add Subtotals for Project: 9999	4.827	0.000
Congressional Add Totals for all Projects	4.827	0.000

Change Summary Explanation

Cost/Technical/Schedule:

1109: Not Applicable

3406 Attack and Utility Replacement Aircraft:

Cost: N/A

Schedule: Force design 2030 necessitated the shift of AURA to the Vertical Take Off and Landing Family of Systems (VTOL FoS), as such our acquisition approach now reflects Concept Development and Tech Maturation starting in FY23 with a direct MS B entry in FY26.

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / Other Helicopter Development	Project (Number/Name) 1109 / CH/MH-53
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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
1109: CH/MH-53	103.815	6.680	2.868	3.657	-	3.657	2.604	2.379	2.424	2.461	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The H-53 helicopter is the premier heavy lift helicopter for the Marine Corps and the only operational airborne mine sweeping platform for the Navy. H-53 efforts will continue to develop and qualify components, prior to production and approval decisions, in order to replace obsolete system components. Emphasis will be placed on supportability improvement modifications that will sustain the H-53 aircraft until the transition of the H-53K is complete. These efforts combined, will significantly improve the readiness of the H-53 fleet while reducing long term operational and supportability costs. Survivability efforts to address improved situational awareness to pilots will include improved Digital Interoperability and improve Degraded Visual Environment Awareness. Modeling and simulation will be used to the maximum practical extent throughout this effort. Manned Flight Simulator will be utilized to develop, install and test interim modifications to existing H-53 legacy avionics, while maintaining the original basic system footprint and functionality. As a part of this effort, a complete Electro Magnetic Vulnerability assessment will be required for the affected and/or modified systems.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: H-53 Avionics	2.429	1.347	1.695	0.000	1.695
Articles:	-	-	-	-	-
FY 2022 Plans:					
Continue to integrate software applications for cockpit and avionics improvements, to include the development of new sensors. Develop flight control computer and test set design modifications to address anticipated obsolescence issues. Conduct Business Case Analyses to determine impact of high Operation and Support cost drivers and address alternatives to mitigate identified issues. Investigate solutions for improved Degraded Visual Environmental to include coupled flight control capability.					
FY 2023 Base Plans:					
Continue to integrate software applications for cockpit and avionics improvements, to include the development of new sensors. Develop flight control computer and test set design modifications to address anticipated obsolescence issues. Conduct Business Case Analyses to determine impact of high Operation and Support cost drivers and address alternatives to mitigate identified issues. Investigate solutions for improved Degraded Visual Environmental to include coupled flight control capability.					
FY 2023 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 1109 / CH/MH-53

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
N/A					
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Increase of \$0.348 million from FY 2022 to FY 2023 to support required H-53 avionics obsolescence upgrades.					
<i>Title:</i> H-53 Survivability	1.569	0.972	1.220	0.000	1.220
<i>Articles:</i>	-	-	-	-	-
<i>FY 2022 Plans:</i> Continue to perform trade studies, risk reduction, design, development, model, integration and test activities for H-53 safety and survivability to include increased situational awareness via digital interoperability.					
<i>FY 2023 Base Plans:</i> Continue to perform trade studies, risk reduction, design, development, model, integration and test activities for H-53 safety and survivability to include increased situational awareness via digital interoperability.					
<i>FY 2023 OCO Plans:</i> N/A					
<i>FY 2022 to FY 2023 Increase/Decrease Statement:</i> Increase of \$0.248 million from FY 2022 to FY 2023 to support required survivability analysis to ensure aircraft survivability throughout the life of the aircraft.					
<i>Title:</i> H-53 Propulsion	0.413	0.000	0.000	0.000	0.000
<i>Articles:</i>	-	-	-	-	-
<i>FY 2022 Plans:</i> N/A					
<i>FY 2023 Base Plans:</i> N/A					
<i>FY 2023 OCO Plans:</i> N/A					
<i>Title:</i> Project Management Support	0.874	0.549	0.742	0.000	0.742
<i>Articles:</i>	-	-	-	-	-
<i>FY 2022 Plans:</i>					

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Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 1109 / CH/MH-53

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>Continue to provide in-house, field activity, and contractor support of IPTs to allow for studies and analyses, preparation of acquisition documentation and examination of equipment and avionics for the H-53. Efforts include, but are not limited to, government development support, engineering support, product management support, system engineering and logistics support, and travel for the H-53 program.</p> <p>FY 2023 Base Plans: Continue to provide in-house, field activity, and contractor support of IPTs to allow for studies and analyses, preparation of acquisition documentation and examination of equipment and avionics for the H-53. Efforts include, but are not limited to, government development support, engineering support, product management support, system engineering and logistics support, and travel for the H-53 program.</p> <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Increase of \$0.193 million from FY 2022 to FY 2023 to support additional avionics and survivability efforts.</p>					
<p>Title: H-53 Airframe</p> <p align="right">Articles:</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Base Plans: N/A</p> <p>FY 2023 OCO Plans: N/A</p>	0.846 -	0.000 -	0.000 -	0.000 -	0.000 -
<p>Title: APR-39D(V)2</p> <p align="right">Articles:</p> <p>FY 2022 Plans: N/A</p> <p>FY 2023 Base Plans: N/A</p> <p>FY 2023 OCO Plans:</p>	0.549 -	0.000 -	0.000 -	0.000 -	0.000 -

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 1109 / <i>CH/MH-53</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
N/A					
Accomplishments/Planned Programs Subtotals	6.680	2.868	3.657	0.000	3.657

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

<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>
• APN/0528: <i>H-53 Series</i>	58.688	81.115	14.870	-	14.870	10.459	6.063	5.779	5.424	Continuing	Continuing

Remarks

APN-5 funding profile does not include funding designated for the CH-53K aircraft (OSIP 007-19).

D. Acquisition Strategy

This is a non-ACAT program. H-53 RDT&E efforts will focus on trade studies and risk reduction measures to identify candidate survivability, interoperability, safety, avionics, cargo handling, cockpit and other airframe specific improvements to extend the service life.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy												Date: April 2022				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
1319 / 5				PE 0604212N / Other Helicopter Development				1109 / CH/MH-53								
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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	
Systems Engineering	WR	NAWC AD : Patuxent River, MD	9.297	0.821	Nov 2020	0.398	Nov 2021	0.495	Nov 2022	-		0.495	Continuing	Continuing	Continuing	
Systems Engineering Contract	C/CPFF	Various : Various	3.491	0.670	Feb 2021	0.320	Feb 2022	0.398	Feb 2023	-		0.398	0.000	4.879	4.161	
Systems Engineering	WR	Various : Various	4.806	0.835	Nov 2020	0.146	Nov 2021	0.193	Nov 2022	-		0.193	Continuing	Continuing	Continuing	
Design and Development	WR	Various : Various	6.276	0.242	Mar 2021	0.097	Mar 2022	0.121	Mar 2023	-		0.121	0.000	6.736	-	
Prior Year Prod Dev no longer funded in the FYDP	TBD	TBD : TBD	19.475	0.000		0.000		0.000		-		0.000	0.000	19.475	-	
Subtotal			43.345	2.568		0.961		1.207		-		1.207	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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	
Software Development	Various	Various : Various	18.696	1.170	Mar 2021	0.100	Mar 2022	0.125	Mar 2023	-		0.125	Continuing	Continuing	Continuing	
GFE	Various	NAWC AD : Patuxent River, MD	4.141	0.280	Nov 2020	0.100	Nov 2021	0.124	Nov 2022	-		0.124	Continuing	Continuing	Continuing	
Subtotal			22.837	1.450		0.200		0.249		-		0.249	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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	Various	Various : Various	17.229	1.375	Mar 2021	1.307	Mar 2022	1.704	Mar 2023	-		1.704	Continuing	Continuing	Continuing	
Subtotal			17.229	1.375		1.307		1.704		-		1.704	Continuing	Continuing	N/A	

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 1109 / <i>CH/MH-53</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CH/MH-53				
Engineering Milestones: - Obsolescence Issues/Studies	1	2021	4	2027
Engineering Milestones: - Survivability Analysis	1	2021	4	2027
Engineering Milestones: - Legacy P3I Efforts	1	2021	4	2027
Engineering Milestones: - Safety Upgrades	1	2021	4	2027
Test & Evaluation: APR-39D(V)2 Capability Analysis, Development & Integration	3	2021	4	2021
Test & Evaluation: Degraded Visual Environment/Low Speed Precision Control Development & Integration	1	2021	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604212N / Other Helicopter Development				Project (Number/Name) 3406 / Attack and Utility Replacement Aircraft			
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
3406: Attack and Utility Replacement Aircraft	29.405	11.072	46.444	62.353	-	62.353	108.860	131.933	133.466	135.685	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

USMC Vertical Take-Off and Landing (VTOL) Family of Systems (FoS) formerly Attack and Utility Replacement Aircraft (AURA) is a United States Marine Corps (USMC) Future Vertical Lift (FVL) initiative addressing vertical lift capability requirements that are feasible and affordable in support of the USMC Warfighter. This is a supporting element of the USMC's Force Design 2030 guidance. USMC VTOL FoS, will provide unmatched strategic, operational, and tactical agility to perform a multitude of missions currently unachievable by any conventionally configured rotorcraft. The USMC VTOL FoS is closely aligned to the OSD-sponsored FVL FoS initiative and will look to leverage any aspects of the Joint Service programs that may benefit the USMC through accelerated development and/or reduced life cycle costs. USMC VTOL FoS will be a force multiplier with superior performance, payload, survivability, agility, endurance, and reliability that enables warfighters to win in a future dynamic battlespace. USMC VTOL FoS will increase the Marine Air Ground Task Force's (MAGTF) capacity of long-range fires and the ability to move cargo and support dispersed expeditionary advanced bases with efforts such as a logistics connector.

USMC VTOL FoS will utilize DOTmLPF-P that will include all facets of a program with particular focus on life-cycle cost reductions through common processes, support equipment, logistic support and component commonality utilizing non-materiel solutions, such as maintenance strategies, training solutions, and infrastructure requirements. The air vehicle will include primary mechanical, electrical, pneumatic, and structural components such as drivetrain, generators, landing gear, hydraulics, controls, seats, etc. The mission subsystems will include all on and off-board components with embedded control software for those components that provide all mission functionality, cockpit displays, cockpit hardware subsystem controllers and interfaces. The architecture will include the fundamental organization of the complete system, the processing method/component(s), the platform software, the operating environment, and the on-aircraft infrastructure to facilitate integration of all subsystems and platform.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded for Design and Prototype Development leading to System Demonstration and includes conducting engineering and manufacturing development tasks aimed at meeting validated requirement prior to full-rate production decision.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Attack and Utility Replacement Aircraft	11.072	46.444	62.353	0.000	62.353
Articles:	-	-	-	-	-
FY 2022 Plans:					
Tasks to be performed may include but are not limited to: Acquisition Program Management functions, Acquisition Documentation, Engineering modeling and analysis, Test and Evaluation planning and development,					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 3406 / <i>Attack and Utility Replacement Aircraft</i>

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
<p>a Model Based System Specification, Draft Capability Development Document, and design trade studies and prototyping on the Air Vehicle and all associated systems. These efforts will include but not be limited to studies, virtual simulation, conceptual design, prototyping of Air Vehicle, Avionics, Propulsion and Dynamics, Communications and Navigation, Weapons and Fire Control, Human Systems Integration, Survivability and Vulnerability, Missions and Missions Systems Management, Reliability and Maintainability, Training, Logistics, Sensor, Pilotage and Targeting Systems, VMS/Flight Control, and Software/Hardware architecture. Support for these efforts will come from government, industry and academia such as Naval Research Labs, DARPA, Georgia Tech Research Institute, John Hopkins APL, Penn State University Applied Research Lab, and various industry partners. Award BAA contracts supporting follow-on Concept Development and Technology Maturation (CDTM) efforts. This early collaboration with industry will advance technologies in the area of a Modular Open Systems Approach (MOSA) to systems architectures, knowledge gains in the execution and adoption of Model Based Systems Engineering (MBSE) that can reduce timelines for engineering endeavors over traditional systems engineering approaches, and the advancement of weapons carriage and employment technologies that will be vital for the success of the VTOL FoS platform.</p> <p><i>FY 2023 Base Plans:</i> Tasks to be performed may include but are not limited to: Acquisition Program Management functions, Acquisition Documentation, Engineering modeling and analysis, Test and Evaluation planning and development, a Model Based System Specification, continued concept development and technology maturation efforts in critical high-risk technology areas, culminating in design trade studies and prototyping on associated systems. Analytical approaches employed by USMC VTOL FoS will ensure a comprehensive look at USMC capability gaps, across aviation platforms, in order to quickly and efficiently address Fleet needs, agnostic to individual materiel solutions. Concept Development and Technology Maturation efforts will include but not be limited to studies, virtual simulation, conceptual design, prototyping of VTOL FoS Air Vehicles, Avionics, Propulsion and Dynamics, Communications and Navigation, Weapons and Fire Control, Human Systems Integration, Survivability and Vulnerability, Missions and Missions Systems Management, Reliability and Maintainability, Training, Logistics, Sensor, Pilotage and Targeting Systems, VMS/Flight Control, Integrated Digital Environment Development, Digital Engineering, Autonomy, Crewed/Uncrewed Systems, and Software/Hardware architecture. Support for these efforts will come from Government, Industry and academia such as Naval Research Labs, DARPA, Georgia Tech Research Institute, Johns Hopkins Applied Physics Lab, Pennsylvania State University Applied Research Lab, and various industry partners. Early collaboration with industry will advance technologies in the area of Modular Open Systems Approach (MOSA) to systems architectures, knowledge gains in the execution and adoption of Model Based Systems Engineering (MBSE) that can reduce timelines for engineering</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 3406 / <i>Attack and Utility Replacement Aircraft</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
endeavors over traditional systems engineering approaches, and reduce risk in key technology areas, such as weapons carriage and employment that will be vital for the success of the USMC VTOL FoS. FY 2023 OCO Plans: N/A FY 2022 to FY 2023 Increase/Decrease Statement: The increase in funding from FY 2022 to FY 2023 enables required technical and acquisition support for the development of VTOL FoS requirements documentation, execution of MOSA OTAs, release and award of Weapons OTAs, and continued execution of concept development and technology maturation efforts.					
Accomplishments/Planned Programs Subtotals	11.072	46.444	62.353	0.000	62.353

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

Remarks

D. Acquisition Strategy
The Analysis of Alternatives (AoA) was initiated in 3QFY2017 to begin the assessment of the technical feasibility, operational feasibility, technical risk, and affordability of potential solutions. The AoA was completed in FY2019 resulting in OSD Sufficiency. In FY 2021, acquisition and requirements documentation refinement continued. MBSE BAAs awarded and execution progressed, allowing the Program to gain insight alongside Industry in implementing Digital Engineering for systems design. In FY 2022, requirements analysis and document generation continued and multiple MOSA OTAs were awarded. Reductions in the technical risk associated with the Program justifies a direct Milestone B entry. In FY 2023, MOSA OTA execution will continue, multiple Weapons OTA awards will occur, a VTOL FoS CDD will be routed for MROC approval, and concept development and technology maturation efforts will continue.

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / Other Helicopter Development	Project (Number/Name) 3406 / Attack and Utility Replacement Aircraft
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Product Development (\$ in Millions)				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			
Industry Technology Collaboration	C/CPFF	Various : Various	0.000	0.000		23.798	Jan 2022	19.234	Nov 2022	-		19.234	Continuing	Continuing	Continuing
Joint All Domain Operations (JADO)/TAC Demo	C/CPFF	Various : Various	0.000	0.000		10.036	Jan 2022	10.019	Jan 2023	-		10.019	Continuing	Continuing	Continuing
Studies and Analysis	C/CPFF	Various : Various	3.477	1.200	Jan 2021	1.755	Jan 2022	0.000		-		0.000	Continuing	Continuing	Continuing
Concept Development and Technology Maturation (CDTM)	C/CPFF	Various : Various	0.000	0.000		0.000		22.000	Dec 2022	-		22.000	Continuing	Continuing	Continuing
Subtotal			3.477	1.200		35.589		51.253		-		51.253	Continuing	Continuing	N/A

Remarks
 The increase in FY 2023 is reflected in the addition of the "Concept Development and Technology Maturation (CDTM)" cost category item. This line captures the Program's execution of technology maturation efforts that are incorporated into the VTOL FoS requirements documentation, such as the CDD, and informed by ongoing Industry Technology Collaboration efforts.
 Decreases to Industry Technology Collaboration category reflects the closeout of the MBSE BAA and progression of MOSA OTA efforts. Decrease to the Studies and Analysis category reflects the transition of associated efforts into prototype development and delivery.

Support (\$ in Millions)				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			
Development Support	WR	NAWCAD : Patuxent River, MD	8.139	4.227	Nov 2020	6.915	Nov 2021	6.050	Nov 2022	-		6.050	Continuing	Continuing	Continuing
Development Support	WR	Various : Various	4.337	2.749	Jan 2021	0.500	Jan 2022	2.900	Nov 2022	-		2.900	Continuing	Continuing	Continuing
Subtotal			12.476	6.976		7.415		8.950		-		8.950	Continuing	Continuing	N/A

Remarks
 The increase in FY 2023 reflects increased support for VTOL FoS' Industry Collaboration contracts informing open systems architectures and weapons employment technology maturation, modeling and analysis contributing to the definition of the Joint Force Operational Scenarios (JFOS), and further refining requirements documentation.

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / Other Helicopter Development	Project (Number/Name) 3406 / Attack and Utility Replacement Aircraft
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Test and Evaluation (\$ in Millions)				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			
Development Test and Evaluation	WR	Various : Various	0.000	0.251	Nov 2020	0.350	Nov 2021	0.500	Jun 2023	-		0.500	Continuing	Continuing	Continuing
Studies and Analysis	C/CPFF	Various : Various	4.551	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Subtotal			4.551	0.251		0.350		0.500		-		0.500	Continuing	Continuing	N/A

Management Services (\$ in Millions)				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			
Contractor Engineering Support	C/CPIF	Various : Various	4.577	1.019	Nov 2020	0.000		0.500	Nov 2022	-		0.500	Continuing	Continuing	Continuing
Program Management Support	WR	Various : Various	3.604	1.591	Nov 2020	3.040	Nov 2021	1.100	Nov 2022	-		1.100	Continuing	Continuing	Continuing
Travel	WR	NAVAIR : Patuxent River, MD	0.720	0.035	Oct 2020	0.050	Oct 2021	0.050	Oct 2022	-		0.050	Continuing	Continuing	Continuing
Subtotal			8.901	2.645		3.090		1.650		-		1.650	Continuing	Continuing	N/A

Remarks
The decrease in FY 2023 is due to more direct support to product development and less management services.

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	29.405	11.072	46.444	62.353	-	62.353	Continuing	Continuing	N/A

Remarks

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / Other Helicopter Development	Project (Number/Name) 3406 / Attack and Utility Replacement Aircraft
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Vertical Take Off and Landing Family of Systems	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
Acquisition Milestones																												
Milestone B																												
Systems Development																												
Concept Development and Tech Maturation																												
MBSE BAA																												
Weapons OTA																												
MOSA OTA																												
UARC Studies and Analysis																												
EMD																												

2023PB - 0604212N - 3406

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 3406 / <i>Attack and Utility Replacement Aircraft</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Vertical Take Off and Landing Family of Systems</i>				
Acquisition Milestones: Milestone B: Milestone B	2	2026	2	2026
Systems Development: Concept Development and Tech Maturation: Concept Development and Tech Maturation	3	2023	2	2026
Systems Development: MBSE BAA: Schedule Detail	1	2021	3	2022
Systems Development: Weapons OTA: Weapons OTA	1	2023	2	2024
Systems Development: MOSA OTA: Schedule Detail	2	2022	1	2024
Systems Development: UARC Studies and Analysis: Schedule Detail	1	2021	4	2023
Systems Development: EMD: EMD	3	2026	4	2027

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</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
9999: <i>Congressional Adds</i>	9.654	4.827	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	14.481
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Attack and Utility Replacement Aircraft (AURA) is a USMC initiative to address vertical lift capability requirements and determine feasible and affordable solutions in support of the USMC Warfighter. AURA will provide unmatched strategic, operational, and tactical agility to perform a multitude of missions currently unachievable by any conventionally configured rotorcraft. AURA will be a force multiplier with superior performance, payload, survivability, agility, endurance, and reliability that enables warfighters to win in a future dynamic battlespace. AURA offers evolutionary operational opportunities over current Vertical Take Off Landing (VTOL) aircraft. In order to reach this goal, anticipated efforts include achieving Milestone A, RFP development and Release, Source Selection, acquisition documentation, risk reduction initiatives, and contract award.

AURA will increase the Marine Air Ground Task Force's (MAGTF) capacity of long-range fires. AURA will utilize DOTmLPF-P that will include all facets of a program with particular focus on life-cycle cost reductions through common processes, support equipment, logistic support and component commonality utilizing non-materiel solutions, such as maintenance strategies, training solutions, and infrastructure requirements. The air vehicle will include primary mechanical, electrical, pneumatic, and structural components such as drivetrain, generators, landing gear, hydraulics, controls, seats, etc. The mission subsystems will include all on and off-board components with embedded control software for those components that provide all mission functionality, cockpit displays, cockpit hardware subsystem controllers, and interfaces. The architecture will include the fundamental organization of the complete system, the processing method/component(s), the platform software, the operating environment, and the on-aircraft infrastructure to facilitate integration of all subsystems and platform.

FY 2021 Congressional Add provides funding for a CH-53E Health Usage Monitoring System.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded for Design and Prototype Development leading to System Demonstration and includes conducting engineering and manufacturing development tasks aimed at meeting validated requirement prior to full-rate production decision.

CH-53E Health Usage Monitoring System: HUMS is budgeted within the 53E APN-5 budget, and there is no requirement for R&D funding for the effort.

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

	FY 2021	FY 2022
Congressional Add: CH-53E Health Usage Monitoring System	4.827	0.000
FY 2021 Accomplishments: N/A		
FY 2022 Plans: N/A		
Congressional Adds Subtotals	4.827	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</i>

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>			<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• RDTE/0604212N/1109: <i>CH/MH-53</i>	6.680	2.868	3.657	-	3.657	2.604	2.379	2.424	2.461	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Analysis of Alternatives (AoA) was initiated in 3rd Quarter FY2017 to begin the assessment of the technical feasibility, operational feasibility, technical risk, and affordability of potential solutions. The AoA was completed in FY2019 resulting in a recommendation for a Milestone A entry and OSD Sufficiency. In FY2021, RFP preparation, prototyping and acquisition documentation efforts will be continued/initiated. In FY2021, industry studies and prototyping will continue, RFP and requirements documentation efforts will continue in preparation for a FY22 Milestone A program entry. The program will complete development and testing of the most cost effective system.

CH-53E Health Usage Monitoring System: HUMS is budgeted within the 53E APN-5 budget, and there is no requirement for R&D funding for the effort.

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / Other Helicopter Development	Project (Number/Name) 9999 / Congressional Adds
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Product Development (\$ in Millions)				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 and Analysis	C/CPFF	Various : Various	8.604	0.000		0.000		0.000		-		0.000	0.000	8.604	-
CH-53E Health Usage Monitoring System (HUMS)	C/CPFF	TBD : TBD	0.000	4.827	Sep 2021	0.000		0.000		-		0.000	0.000	4.827	-
Subtotal			8.604	4.827		0.000		0.000		-		0.000	0.000	13.431	N/A

Remarks
 FY20 Congressional funds support multiple concept advancement efforts in key areas, such as MOSA, MBSE, etc. in order to reduce risk for upcoming Milestone A.
 FY21 Congressional funds support CH-53E Health Usage Monitoring System (HUMS). HUMS is budgeted within the 53E APN-5 budget, and there is no requirement for R&D funding for the effort.

Support (\$ in Millions)				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			
Developmental Support	WR	NAWCAD : PAXR	0.651	0.000		0.000		0.000		-		0.000	0.000	0.651	-
Subtotal			0.651	0.000		0.000		0.000		-		0.000	0.000	0.651	N/A

Management Services (\$ in Millions)				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			
Program Management Support	WR	NAWCAD : PAXR	0.399	0.000		0.000		0.000		-		0.000	0.000	0.399	-
Subtotal			0.399	0.000		0.000		0.000		-		0.000	0.000	0.399	N/A

			Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			9.654	4.827	0.000	0.000	-	0.000	0.000	14.481	N/A

Remarks

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / Other Helicopter Development	Project (Number/Name) 9999 / Congressional Adds
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CH-53E Super Stallion	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				
Systems Development																																
CH-53E Health Usage Monitoring System																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604212N / <i>Other Helicopter Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>CH-53E Super Stallion</i>				
Systems Development: CH-53E Health Usage Monitoring System: Schedule Detail	1	2021	4	2022