Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy											Date: April 2022	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy* / BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604262N / *V-22A*							
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	9,787.695	128.400	105.729	125.233	-	125.233	136.158	106.511	122.453	105.024	Continuing	Continuing
1425: *V-22*	9,787.695	116.888	86.553	98.007	-	98.007	126.151	30.072	43.241	24.427	0.000	10,313.034
3090: *V-22 Improvement Program*	0.000	11.512	14.926	27.226	-	27.226	10.007	76.439	79.212	80.597	Continuing	Continuing
9999: *Congressional Adds*	0.000	0.000	4.250	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.250
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 212												

A. Mission Description and Budget Item Justification

The V-22 Osprey is an Acquisition Category IC Joint Program led by the Department of the Navy for the purpose of developing, testing, evaluating, procuring and fielding a tilt rotor, vertical takeoff and landing aircraft for Joint Service application. The V-22 program is designed to provide an aircraft to meet the amphibious/vertical assault needs of the Marine Corps, the Carrier Onboard Delivery needs of the Navy, and the special operations needs of the Air Force and the United States Special Operations Command (USSOCOM). The MV-22 variant replaced the CH-46E in the Marine Corps and the CMV-22 variant will replace the C-2A in the Navy. The CV-22 variant replaced the MH-53J and MH-53M and augments the C-130 in the Air Force and USSOCOM. The V-22 is capable of flying over 2,100 nautical miles, with a single refueling, giving the services the advantage of a vertical/short take-off and landing aircraft that can rapidly self-deploy to any location in the world. This program is funded under Engineering Manufacturing and Development for correction of deficiencies and includes Block B upgrades which encompassed engineering and manufacturing development of new end-items prior to the production incorporation decision as well as Block C suitability and effectiveness development upgrades. Currently converting all Block B to Block C configuration. Capability Development Document interoperability requirements were addressed through a spiral upgrade acquisition strategy. It was the first spiral upgrade providing Key Enabling Department of Defense mandated open systems architecture upgrades for the mission computer hardware and software while simultaneously addressing required interoperability common avionics upgrades and current avionics obsolescence issues. Future development efforts will include pre-planned-product-improvements in the capability development document and re-design efforts to correct critical Reliability, Maintainability and Availability issues in support of readiness Operational Safety Improvement Program as prioritized by the United States Marine Corps (USMC) or an Urgent Universal Needs Statement.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	132.427	107.984	0.000	-	0.000
Current President's Budget	128.400	105.729	125.233	-	125.233
Total Adjustments	-4.027	-2.255	125.233	-	125.233
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-6.505			
• Congressional Rescissions	-	-			
• Congressional Adds	-	4.250			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.452	0.000			
• SBIR/STTR Transfer	-3.575	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	-	-	125.233	-	125.233

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Project: 9999: *Congressional Adds*		
Congressional Add: *V-22 oil coolers*	0.000	4.250
Congressional Add Subtotals for Project: 9999	0.000	4.250
Congressional Add Totals for all Projects	0.000	4.250

Change Summary Explanation

FY 2023 funding request was reduced by $13.078 million to account for the availability of prior year execution balances.

Schedule:
Project Unit 1425:
1. Hardware Development - Improved Inlet Solution/Engine Air Particle Separator (EAPS) 2.0 schedule updated to reflect program delay due to inlet design complexities and requisite design changes to meet EAPS environmental performance requirements.
2. Electrical System Re-design - Schedule updated to reflect program delay due to the Constant Frequency Generator CS117 Electromagnetic Interference test failure.
3. Infrared Suppressor Re-design - Schedule updated to reflect program delay due to structural analysis completion and down selection from three to one design.
4. Degraded Visual Environment/Helmet Mounted Display - Schedule updated to reflect delay due to contract protest.

Schedule:

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*

Project Unit 3090:
1. Flight Control System Re-design - Schedule updated to reflect a Fixed Price Incentive Fee contract award. NRE has been added as it was missing from the schedule.
2. Open Systems Architecture/Cyber Security - Schedule has been updated to reflect the total re-design of the Cockpit System versus individual components.

Schedule:
Project Unit 9999:
1. Congressional add for Oil Coolers, new schedule added.

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

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 0604262N / *V-22A*				Project (Number/Name) 1425 / *V-22*			
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**
1425: *V-22*	9,787.695	116.888	86.553	98.007	-	98.007	126.151	30.072	43.241	24.427	0.000	10,313.034
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 212

A. Mission Description and Budget Item Justification

The V-22 Osprey is an Acquisition Category IC Joint Program led by the Department of the Navy for the purpose of developing, testing, evaluating, procuring and fielding a tilt rotor, vertical takeoff and landing aircraft for Joint Service application. The V-22 program is designed to provide an aircraft to meet the amphibious/vertical assault needs of the Marine Corps, the Carrier Onboard Delivery (COD) needs of the Navy, and the special operations needs of the Air Force and the United States Special Operations Command (USSOCOM). The V-22 is replacing the CH-46E in the Marine Corps with the MV-22; will supplement the H-60 in the Navy with the MV-22; and replace the MH-53J and MH-53M as well as augment the C-130 in the Air Force and USSOCOM with the CV-22. The V-22 is capable of flying over 2,100 nautical miles, with a single refueling, giving the services the advantage of a Vertical/Short Take-off and Landing aircraft that can rapidly self-deploy to any location in the world. This program is funded under Engineering Manufacturing and Development (EMD) for correction of deficiencies and includes Block B upgrades which encompassed engineering and manufacturing development of new end-items prior to the production incorporation decision as well as Block C suitability and effectiveness development upgrades. Currently converting all Block B to Block C configuration. Capability Development Document interoperability requirements were addressed through a spiral upgrade acquisition strategy. It was the first spiral providing Key Enabling, Department of Defense mandated, open systems architecture upgrades for the mission computer hardware and software while simultaneously addressing required interoperability common avionics upgrades and current avionics obsolescence issues. Future development efforts will include Pre-Planned-Product-Improvements in the Capability Development Document and re-design efforts to correct critical Reliability, Maintainability and Availability issues in support of readiness Operational Safety Improvement Program as prioritized by the United States Marine Corps (USMC) or a Urgent Universal Needs Statement.

FY 2023 continues Airframe Hardware Development to fund development efforts in support of V-22 Block upgrades, Time on Wing, ARC-210 Series Radio and Safety Improvement efforts such as Condition Based Maintenance. Continues engineering, logistics, flight test, flight test support and addresses the correction of deficiencies and obsolescence. Continues V-22 software development/mission computer obsolescence initiatives such as transition tech demo and modular avionics mission computer re-design. Continues correcting deficiencies on the current Engine Air Particle Separator (EAPS), and Enhanced Standby Flight Instrument (ESFI).

FY 2023 continues Propulsion/Mission Care Hardware Development to fund the flight/engine hours that are necessary for the design, development, validation and verification of the V-22 propulsion and power systems at the Patuxent River squadron. Rolls-Royce will continue to provide engine support and development of V-22 flight testing.

FY 2023 continues the CMV-22 Hardware Development efforts which consist of an Engineering Change Proposal (ECP) to modify the MV-22 into the CMV-22 configuration to perform the COD mission. The ECP will add such things as (1) the capability to meet the range requirements that the COD mission demands, (2) a high frequency (HF) radio to transmit/receive beyond line of sight (BLOS) over water, (3) a public address (PA) system for use while transporting passengers, (4) an improved cargo handling system, and (5) enhanced fuel jettison system. CMV-22 will continue developmental testing to include preliminary envelope expansion,

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

Electromagnetic Environment Effects testing, HF radio testing, Carrier Suitability and integration testing. CMV-22 will continue to support development efforts such as: Infrared Suppressor (IRS) re-design, Center Console re-design, and Modular Avionics/Cyber Security Implementation.

FY 2023 continues the integration of the new Infrared Suppressor system for the V-22. The IRS system masks the infrared signature of an aircraft which increases the survivability.

FY 2023 continues Open System Architecture/Cyber Security development efforts to provide new capabilities focused on enhancing survivability, software and hardware modularity, and maturation of robust aircraft data interfaces. Continues risk reduction and development efforts such as Cyber-Resilient interoperability, Modular Avionics/ Cyber Security Implementation, Cyber Safe Flight Control improvements,and Cockpit Avionics re-design. Continues research, requirements analysis, and design and development of obsolescence mitigation solutions for aging V-22 Avionics systems to overcome obsolete hardware availability. Replacement systems will be designed to provide compatibility with all legacy interfaces and functions while resolving deficiencies, meeting expanding needs, and leveraging emerging hardware and software technologies to mitigate future obsolescence.

FY 2023 continues risk reduction and developmental efforts for improved situational awareness and safety in Degraded Visual Environment (DVE) situations. A Digital Helmet Mounted Display (HMD) system integrated with an Integrated Processor operating in an Ethernet Environment is required to interface and function with the new Enhanced Visual Acuity (EVA) system being developed. The DVE/HMD safety improvement is a Deputy Commandant for Aviation priority.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under OPERATIONAL SYSTEMS DEVELOPMENT because it includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate funding in the current or subsequent fiscal year.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: V-22 Airframe Hardware Development	30.565	22.877	28.911	0.000	28.911
Articles:	-	-	-	-	-
Description: The V-22 Airframe Hardware Development continues to fund development efforts in support of V-22 Block upgrades, electrical system capacity efforts, ARC-210 Series Radio and Time on Wing/Reliability Improvement efforts such as testing of Additive Manufacturing processes for selected V-22 components. Continues Aircraft Mission Maneuvering Envelope Expansion and Safety Improvement efforts such as Condition Based Maintenance. Continues engineering, logistics, flight test, flight test support and addresses the correction of deficiencies and obsolescence. Continues V-22 software development/sustainment efforts such as transition tech demo and Modular Avionics Mission Computer Obsolescence Initiative re-design. Continues correcting deficiencies on the current EAPS and ESFI. Continues development of particle separation solutions that will improve maintainability and reliability which will facilitate improved mission capable rates and long-term operational success.					
FY 2022 Plans:					

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continues V-22 development efforts including rotor blade tabs. Continues V-22 software development efforts. Continues development in support of V-22 Block upgrades, Time on Wing/Reliability Improvements such as testing of Additive Manufacturing processes for selected V-22 components. Continues Aircraft Mission Maneuvering Envelope Expansion and Safety Improvement efforts such as Condition Based Maintenance. Continues engineering, logistics, flight test and flight test support. Addresses correction of deficiencies and obsolescence efforts such as EAPS, Air Data Unit, Defensive Weapons capabilities, Mission system upgrades, radar warning system, integration with an upgraded missile warning and active infrared countermeasure system, cockpit interface units, training upgrades and developments and in addition ESFI. Continues reliability improvement efforts as well as re-design efforts to correct critical Reliability, Maintainability and Availability issues in support of readiness Operational Safety Improvement Program. ***FY 2023 Base Plans:*** Continues V-22 software development efforts. Continues development in support of V-22 Block upgrades, Time on Wing/Reliability Improvements such as testing of Additive Manufacturing processes for selected V-22 components. Continues Aircraft Mission Maneuvering Envelope Expansion and Safety Improvement efforts such as Condition Based Maintenance. Continues engineering, logistics, flight test and flight test support. Addresses correction of deficiencies and obsolescence efforts such as EAPS, Air Data Unit, cockpit interface units, training upgrades and developments and in addition ESFI. Continues reliability improvement efforts as well as re-design efforts to correct critical Reliability, Maintainability and Availability issues in support of readiness Operational Safety Improvement Program. Begin Primary Lightning Control Unit re-design. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Airframe Hardware Development is due to the start of the Primary Lightning Control Unit Re-design.					
Title: V-22 Propulsion / Mission Care Hardware Development	0.844	1.849	1.886	0.000	1.886
Articles:	-	-	-	-	-
Description: Propulsion/Mission Care Hardware Development funds the flight/engine hours that are necessary for the design, development, validation and verification of the V-22 propulsion and power systems at the Patuxent River squadron. In addition, it pays for Rolls Royce to provide engine support and development of the V-22 flight testing. ***FY 2022 Plans:***					

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continues flight/engine hours that are necessary for the design, development, validation, and verification of the V-22 propulsion and power systems at the Patuxent River squadron. Rolls Royce will continue to provide engine support and development of V-22 flight testing. ***FY 2023 Base Plans:*** Continues flight/engine hours that are necessary for the design, development, validation, and verification of the V-22 propulsion and power systems at the Patuxent River squadron. Rolls Royce will continue to provide engine support and development of V-22 flight testing. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Propulsion/Mission Care Hardware Development is due to inflation.					
Title: V-22 CMV Development	23.860	9.999	16.521	0.000	16.521
Articles:	-	-	-	-	-
Description: Funding supports the implementation of an ECP to incorporate the new systems required for the CMV-22 configuration to perform the COD mission. The ECP will add (1) the capability to meet the range requirements that the COD mission demands (2) a HF radio to transmit/receive BLOS over water, (3) a PA system for use while transporting passengers, (4) an improved cargo handling system, and (5) enhanced fuel jettison system. CMV-22 will execute developmental testing to include things such as preliminary envelope expansion, Electromagnetic Environment Effects testing, HF radio testing and begin Carrier Suitability and Integration testing. Continue CMV-22 Electrical System re-design, IRS re-design, Center Console re-design, Flight Control System (FCS) re-design and Modular Avionics/Cyber Security Implementation. ***FY 2022 Plans:*** Begin integration of the Joint Precision Automated Landing System (JPALS). Continues the spiral development of the Required Navigation Performance/Area Navigation Capability to upgrade to full precision approach capability and coupled approach. Supports the Future Readiness Initiative to fully automate data ingestion of all applicable data sources to include conditioning, cleansing, transformation, persistence and retrieval from a unified data repository in an organized, ready for use format. ***FY 2023 Base Plans:*** Continues funding for the CMV-22 Development effort to perform the COD mission. Support the development of Functional Test Plans for the HF radio to transmit/receive BLOS over water and the PA system. Development					

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
of the Joint Vertical Experimental Application System Software will continue. Continue the developmental testing for the CMV-22 preliminary envelope expansion and Electromagnetic Environment Effects. Continue Modular Avionics software development/sustainment efforts such as Mission Computer obsolescence initiative re-design and modular software. Continue developmental efforts such as electrical system re-design, IRS re-design, and Cyber Security implementation. Continue the Carrier Suitability and Integration testing. Continue Operational testing. Continue Interoperability development for additional critical capabilities such as Link-16, Terrain Avoidance Warning System II, Mobile Users Objective System, Mobile Expeditionary Communications System and secondary BLOS. Continue the spiral development of the Required Navigation Performance / Area Navigation capability to upgrade to full precision approach capability and coupled approach. Continue integration of JPALS. Support the Future Readiness Initiative to fully automate data ingestion of all applicable data sources to include conditioning, cleansing, transformation, persistence and retrieval from a unified data repository in an organized, ready for use format. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for CMV Development accounts for the ramp up of the Non-Recurring Engineering development effort for JPALS and additional funding added to FCS to fully fund the CMV scope of work planned for FY 2023.					
Title: V-22 Electrical System Re-design ***Articles:*** ***Description:*** Continues Electrical System re-design and reliability improvement efforts. Upgrading the V-22 electrical system reliability and capacity is required to accommodate demands on electrical power system as additional systems are added to the V-22 aircraft. This effort will design, develop, validate and verify engineering solutions to improve: (1) the Constant Frequency Generator Control Unit (CFG/GCU), (2) other frequency generators and (3) all associated electrical system interfaces. ***FY 2022 Plans:*** Continues Electrical System re-design and reliability improvement efforts with the design, development, validation and verification of engineering solutions to improve the V-22 CFG/GCU hardware. ***FY 2023 Base Plans:***	1.335 -	0.608 -	0.000 -	0.000 -	0.000 -

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

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 ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Decrease in FY 2023 for Electrical System Re-design is due to the completion of the development effort. Any remaining efforts will be completed with FY 2022 funding.					
Title: V-22 Infrared Suppressor (IRS) Re-design ***Articles:*** ***Description:*** IRS re-design and reliability improvement efforts mask the infrared signature of the V-22 aircraft, which increases the operational survivability. The current IRS system fails to meet reliability requirements and continues to be a readiness degrader. V-22 IRS system includes funds for EMD and instrumented flight test of IRS system solutions. ***FY 2022 Plans:*** N/A ***FY 2023 Base Plans:*** Funding continues the integration of the new IRS system for the V-22. The IRS system masks the infrared signature of an aircraft which increases the survivability. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Infrared Suppressor (IRS) re-design is due to testing of the new IRS system.	0.362 -	0.000 -	0.500 -	0.000 -	0.500 -
Title: V-22 Development Support, Test and Evaluation ***Articles:*** ***Description:*** Funds Government Engineering and Contractor Engineering, including Follow-On Test & Evaluation (FOT&E), Developmental Test & Engineering (DT&E), and Operational Test & Evaluation (OT&E) for the V-22 flight events. Perform Government oversight. Execute test program risk reduction efforts. ***FY 2022 Plans:***	42.267 -	26.697 -	25.176 -	0.000 -	25.176 -

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Funds provided for continued support of FOT&E, DT&E and OT&E to include vehicle flight control software updates, mission systems software and hardware updates, inlet distortion, environmental control systems, structural fatigue, high density altitude envelope expansion, Nacelle Improvements, Integrated Aircraft Survivability Equipment, Sea Trials, communication systems, navigation systems, weapons systems and CMV Developmental Test and Communications upgrades. ***FY 2023 Base Plans:*** Funds provided for continued support of FOT&E, DT&E and OT&E to include vehicle flight control software updates, mission systems software and hardware updates, inlet distortion, environmental control systems, structural fatigue, high density altitude envelope expansion, Nacelle Improvements, Integrated Aircraft Survivability Equipment, Sea Trials, communication systems, navigation systems, weapons systems, Degraded Visual Environment/Helmet Mounted Display (DVE/HMD), and CMV Developmental Test and Communications upgrades. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Decrease in FY 2023 for Development Support, Test and Evaluation is due to the ramp down of DT&E efforts as the program transitions out of the EMD phase.					
Title: V-22 Open Systems Architecture / Cyber Security	6.811	11.760	11.995	0.000	11.995
Articles:	-	-	-	-	-
Description: Open System Architecture/Cyber Security provides non-proprietary hardware and software agnostic architecture and interfaces, focused on enhancing survivability, maturation of software and hardware modularity, rapid technology and capability insertion, obsolescence mitigation, and maturation of aircraft interfaces to support robust, Cyber-Resilient interoperability and data routing/transfers. The project includes risk reduction and development efforts such as Modular Avionics Architecture, Cyber Security Implementation, and Cyber Safe Flight Control improvements for Control Display Units, Standby Flight Indicators, Keyboard Unit, Engine Instrument Crew Alerting System, Remote Frequency Indicator Selector, Heads-Up Displays, and Flight Director Panel. Provides integrated solutions for Mission Computer Obsolescence mitigation, functional upgrades, Ethernet backbone (High speed Ethernet communication), Ethernet switches and routing functions to enable distributed processing. Joint Avionics Reconfigurable Virtual Information System (JARVIS) along with associated JARVI modules and Ethernet connectivity for distributed modular processing are the current open system architecture efforts being developed.					

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
FY 2022 Plans: Continues requirement analysis, integration studies, risk reduction testing and developmental efforts for Modular Avionics Architecture, CDU obsolescence mitigation, Ethernet backbone and Ethernet switches and routing functions. Continues development of JARVIS Mission Computer System, associated JARVI modules, and Ethernet switches and routing functions for distributed modular processing. ***FY 2023 Base Plans:*** Continues requirements analysis, integration studies, integrated designs, risk reduction testing and developmental efforts for Modular Avionics Architecture, Cockpit Avionics obsolescence mitigation, Ethernet backbone, Ethernet switches and routing functions. Continues development of JARVIS Mission Computer System, associated JARVI modules, Ethernet switches and routing functions for distributed modular processing. Begins the Cockpit Avionics re-design. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Open Systems Architecture/Cyber Security is due to inflation.					
Title: V-22 Degraded Visual Environment/Helmet Mounted Display (DVE/HMD)	10.844	12.763	13.018	0.000	13.018
Articles:	-	-	-	-	-
Description: The V-22 Digital HMD will reduce heads down time and provide better situational awareness and crew coordination to improve safety in DVE. A digital HMD is required to provide host power and digital video interface for the EVA system being developed. The DVE/HMD safety improvement is a Deputy Commandant for Aviation priority. ***FY 2022 Plans:*** Continues DVE developmental efforts to improve safety when conducting reduced visibility landings and will include requirements analysis, risk reduction and developmental efforts for the digital HMD and EVA interfaces. Continue Non-Recurring Engineering efforts to include completion of the Preliminary Design Review and Systems Requirements Review. Begin qualification testing. ***FY 2023 Base Plans:*** Continues DVE developmental efforts to improve safety when conducting reduced visibility landings which will include requirements analysis, risk reduction and developmental efforts. Begin Flight Test. ***FY 2023 OCO Plans:***					

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

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 ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Degraded Visual Environment/Helmet Mounted Display is due to Inflation.					
Accomplishments/Planned Programs Subtotals	116.888	86.553	98.007	0.000	98.007

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• APN 0164: *V-22*	1,263.314	1,103.574	31.795	-	31.795	12.692	0.000	0.000	0.000	872.146	35,559.651
• APN 0590: *V-22 Series*	320.584	310.512	207.621	-	207.621	246.609	225.100	228.349	275.302	1,650.614	5,550.288
• APN 0605/J0164: *V-22 Inital Spares*	6.238	25.627	26.461	-	26.461	26.276	27.066	0.000	0.000	377.899	489.567
• RDTE 1160403BB: *CV-22 Special Operations, Aviation Systems*	16.773	6.932	0.000	-	0.000	0.000	9.727	19.064	0.000	Continuing	Continuing
• RDTE BA07 0401318F: *CV-22 USAF BA07*	17.823	17.189	17.253	-	17.253	17.518	15.829	16.152	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

The V-22 is a post Milestone III ACAT-IC program. As a result of mishaps during and subsequent to V-22 Operational Evaluation (Apr and Dec 00), the program was restructured employing a phased approach to return to flight and tactical introduction. The Contractor and Government defined deficient areas within the program/ aircraft requiring correction prior to return to flight. A Block Upgrade approach was planned, with required efforts identified in Block "A", "B", and "C". Block "A" included those efforts necessary to return the V-22 to safe and operational fleet operations. Block "B" included those efforts necessary to improve the effectiveness and suitability of the aircraft. Block "C" includes mission enhancements like weather radar, cabin effectiveness suitability improvements, i.e., Environmental Control System, and Forward Firing ALE-47. Non-recurring development activities will be initiated and completed for all efforts identified in Block "A", "B", and "C". The Contractor will develop specific statements of work and preliminary specification change notices required to integrate the block upgrade efforts into the baseline Program. A Systems Requirements Review, Initial Design Review, and Final Design Review was held for each of the block efforts so the design maturity could be reviewed and the Government could redirect activities as appropriate. The CV-22 EMD program is also structured in Blocks to define an evolutionary approach to achieving full operational capability. Block "0" is the initial baseline CV-22 variant. Block "10" enhances mission capability with the addition of terrain following radar, additional fuel tanks, additional radios, and Block "20" includes capabilities such as radio frequency and infrared countermeasures improvements. Additional Blocks are in the planning stages to continue the growth process throughout the operational life of the weapon system. The CMV-22 will add (1) the capability to meet the range requirements that the COD mission demands (2) a HF radio to transmit/receive BLOS over water, (3) a PA system for use while transporting passengers in support of the COD mission, (4) an improved cargo handling system, and (5) enhanced fuel jettison system.

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 0604262N / *V-22A*	Project (Number/Name) 1425 / *V-22*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 Airframe Hardware Dev	Various	Various : Various	150.024	30.565	Jan 2021	22.877	Jan 2022	28.911	Jan 2023	-		28.911	49.376	281.753	-
V-22 Propulsion Hardware Dev	SS/CPIF	Rolls-Royce Corp. : Indianapolis, IN	199.314	0.844	Nov 2020	1.849	Nov 2021	1.886	Nov 2022	-		1.886	0.276	204.169	204.169
V-22 CMV Development	Various	Various : Various	195.413	23.860	Jan 2021	9.999	Jan 2022	16.521	Jan 2023	-		16.521	30.708	276.501	-
V-22 Electrical System Re-Design	SS/FFP	Hamilton Sundstrand Corp : Rockford, IL	15.160	1.335	Nov 2020	0.608	Mar 2022	0.000		-		0.000	0.000	17.103	17.103
V-22 IRS Re-design	SS/CPFF	Honeywell : Tempe, AZ	6.030	0.362	Jun 2021	0.000	Jul 2022	0.500	Jul 2023	-		0.500	0.000	6.892	6.892
V-22 Open Systems Architecture / Cyber Security	Various	Various : Various	12.482	6.811	Mar 2021	11.760	Mar 2022	11.995	Mar 2023	-		11.995	33.628	76.676	-
V-22 Degraded Visual Environment/Helmet Mounted Display	C/CPIF	Various : Various	2.149	10.844	May 2021	12.763	Jul 2022	13.018	Jul 2023	-		13.018	22.974	61.748	-
Prior year Prod Dev no longer funded in FYDP	Various	Various : Various	5,302.599	0.000		0.000		0.000		-		0.000	0.000	5,302.599	-
		Subtotal	5,883.171	74.621		59.856		72.831		-		72.831	136.962	6,227.441	N/A

Remarks

Airframe Hardware Development: Increase is due to the start of the Primary Lightning Control Unit re-design.
Propulsion Hardware Development: Increase is due to inflation.
CMV Development: Increase is due to the ramp up of the Non-Recurring Engineering development effort for Joint Precision Automated Landing System and additional funding added for the Flight Control System effort to fully fund FY 2023 efforts.
Electrical System Re-design: Decrease is due to the completion of the development effort.
IRS Re-design: Increase is due to testing of the new IRS system.
Open Systems Architecture: Increase is due to inflation.
Degraded Visual Environment/Helmet Mounted Display: Increase is due to inflation.

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 0604262N / *V-22A*	Project (Number/Name) 1425 / *V-22*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 MV Govt Engineering Sppt	WR	Various : Pax River, MD	1,124.432	2.689	Nov 2020	3.535	Nov 2021	3.805	Nov 2022	-		3.805	13.752	1,148.213	-
V-22 CMV Govt Engineering Sppt	WR	Various : Pax River, MD	38.585	10.744	Nov 2020	4.539	Nov 2021	2.591	Nov 2022	-		2.591	5.907	62.366	-
Prior Year Support no longer funded in the FYDP	Various	Various : Various	189.718	0.000		0.000		0.000		-		0.000	0.000	189.718	-
		Subtotal	1,352.735	13.433		8.074		6.396		-		6.396	19.659	1,400.297	N/A

Remarks

MV Government Engineering Support: Increase is due to civilian pay and NWCF rate adjustments.
CMV Government Engineering Support: Decrease is due to the completion of the Link-16 AIRWorks Communication Suite.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 Dev Test & Evaluation	WR	NAWCAD : Pax River, MD	1,084.913	15.338	Nov 2020	10.232	Nov 2021	10.437	Nov 2022	-		10.437	17.436	1,138.356	-
V-22 Operational Test & Evaluation	WR	OT&E Force : Norfolk, VA	66.582	2.179	Dec 2020	2.883	Dec 2021	2.941	Dec 2022	-		2.941	17.182	91.767	-
V-22 CMV Dev Test & Evaluation	WR	NAWCAD : Pax River, MD	10.300	5.010	Nov 2020	1.900	Nov 2021	1.747	Nov 2022	-		1.747	10.633	29.590	-
V-22 CMV Operational Test & Evaluation	WR	OT&E Force : Norfolk, VA	4.301	1.050	Dec 2020	1.000	Dec 2021	1.000	Dec 2022	-		1.000	0.000	7.351	-
Prior Year T & E no longer funded in the FYDP	Various	Various : Various	48.200	0.000		0.000		0.000		-		0.000	0.000	48.200	-
		Subtotal	1,214.296	23.577		16.015		16.125		-		16.125	45.251	1,315.264	N/A

Remarks

Development Test & Evaluation: Increase is due to inflation.
Operational Test & Evaluation: Increase is due to inflation.
CMV DT&E: Decrease is due to the ramp down of DT&E efforts as the program transitions into the production phase.

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 0604262N / *V-22A*	Project (Number/Name) 1425 / *V-22*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 Engineering Tech Sppt	Various	Various : Various	1,050.085	1.215	Dec 2020	0.752	Dec 2021	0.767	Dec 2022	-		0.767	4.842	1,057.661	-
V-22 Management Sppt Svc	Various	Various : Various	158.990	0.409	Jan 2021	0.286	Jan 2022	0.292	Jan 2023	-		0.292	6.851	166.828	-
V-22 Program Mgmt Support	WR	NAWCAD : Pax River, MD	68.252	3.453	Nov 2020	0.873	Nov 2021	0.890	Nov 2022	-		0.890	7.589	81.057	-
V-22 CMV Engineering Tech Sppt	Various	Various : Various	1.422	0.041	Jan 2021	0.452	Jan 2022	0.461	Jan 2023	-		0.461	0.527	2.903	-
V-22 Travel	WR	Various : Various	17.366	0.087	Sep 2021	0.185	Sep 2022	0.185	Sep 2023	-		0.185	2.130	19.953	-
V-22 CMV Travel	WR	Various : Various	0.291	0.052	Sep 2021	0.060	Sep 2022	0.060	Sep 2023	-		0.060	0.080	0.543	-
Prior Year Mgmt Svcs no longer funded in the FYDP	Various	Various : Various	41.087	0.000		0.000		0.000		-		0.000	0.000	41.087	-
		Subtotal	1,337.493	5.257		2.608		2.655		-		2.655	22.019	1,370.032	N/A

Remarks

All increases to Management Services in FY 2023 are due to inflation.

	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	9,787.695	116.888		86.553		98.007		-		98.007	223.891	10,313.034	N/A

Remarks

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

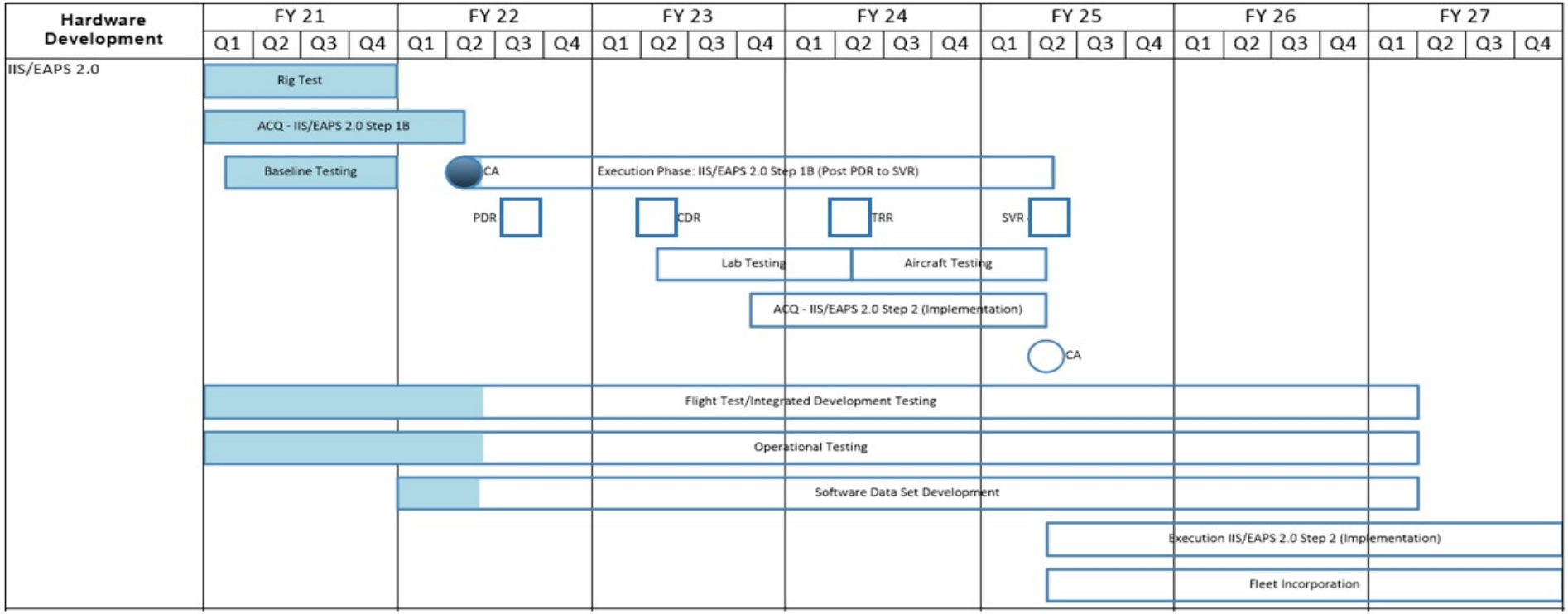

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

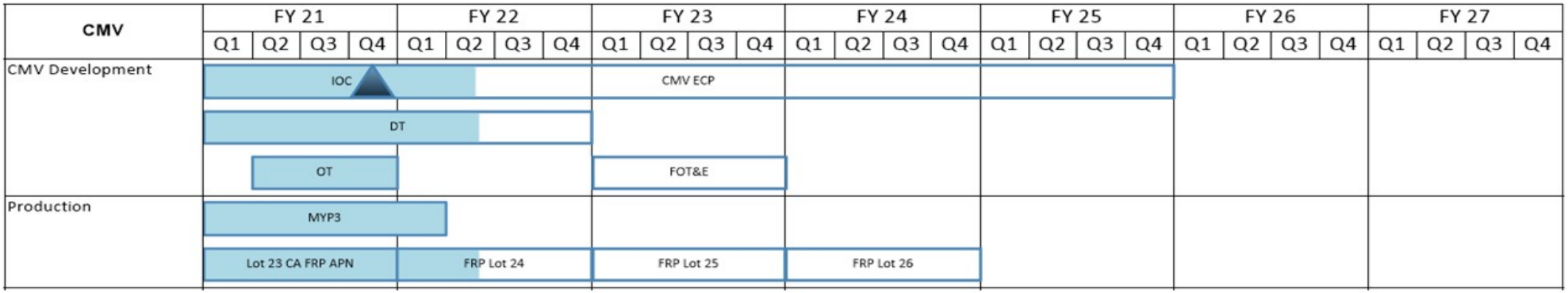

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

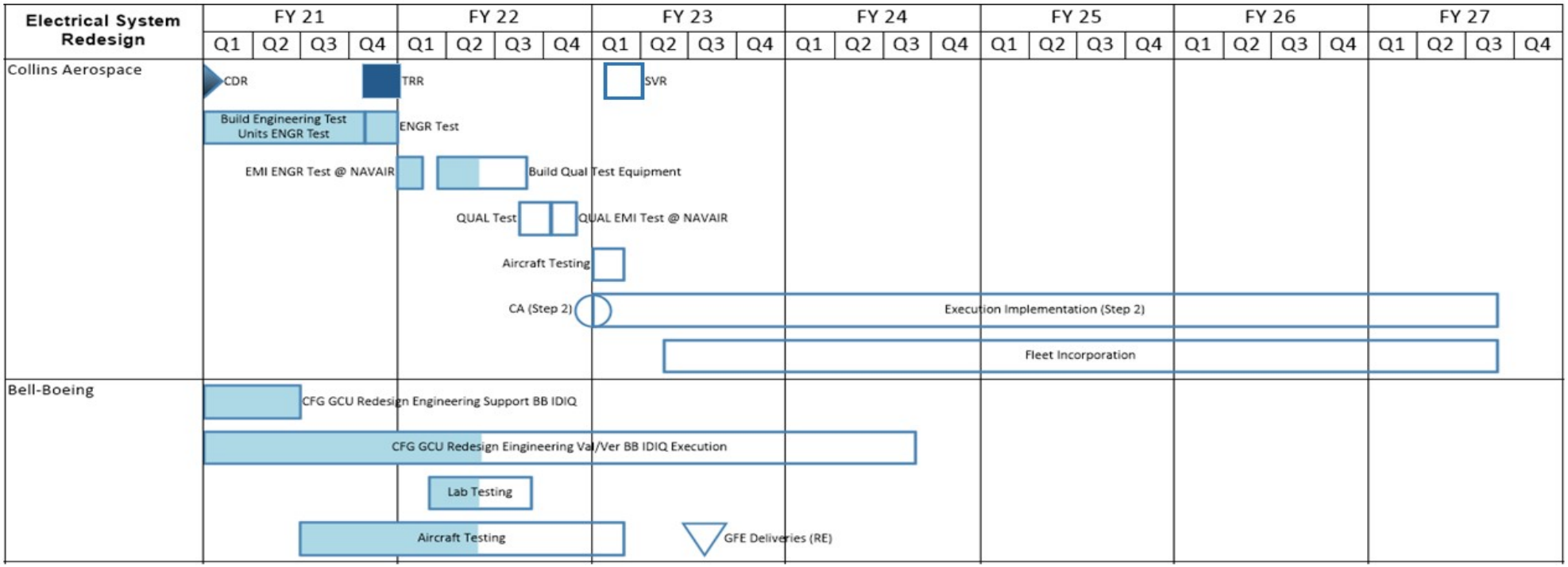

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

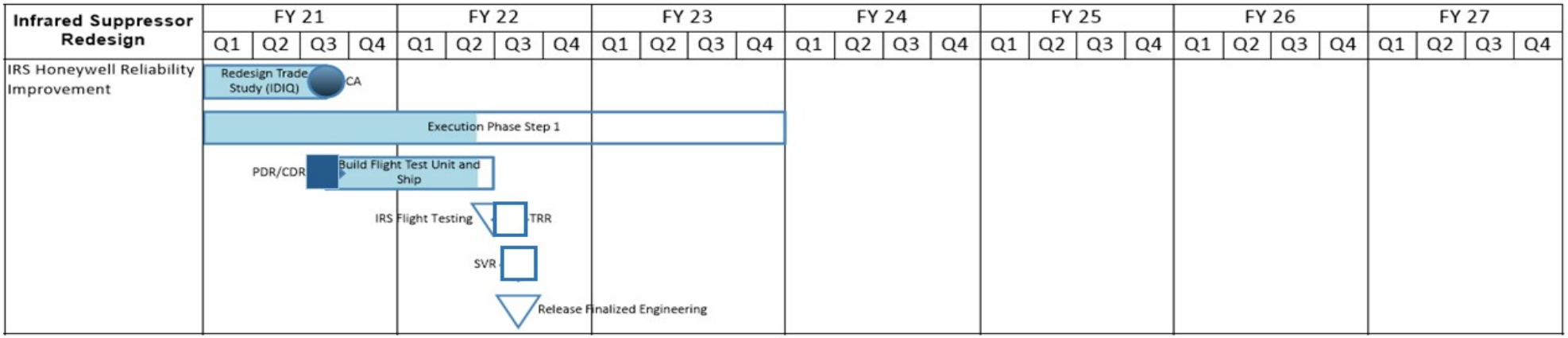

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

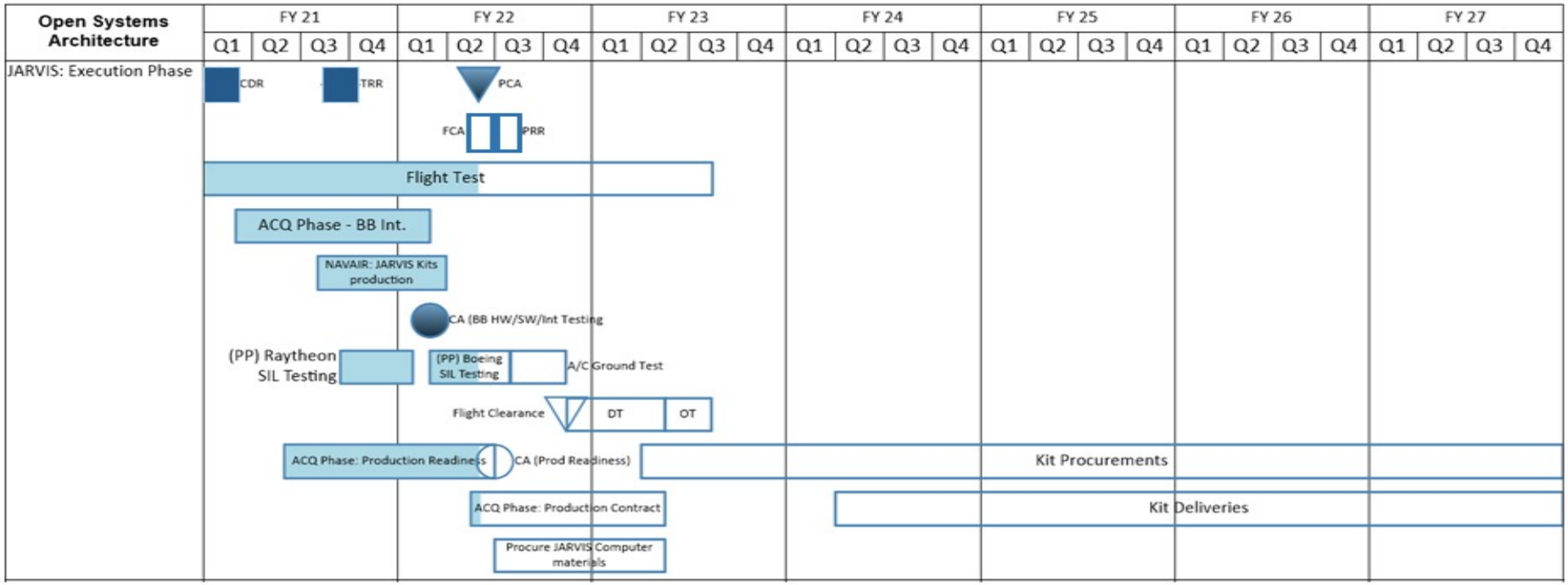

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

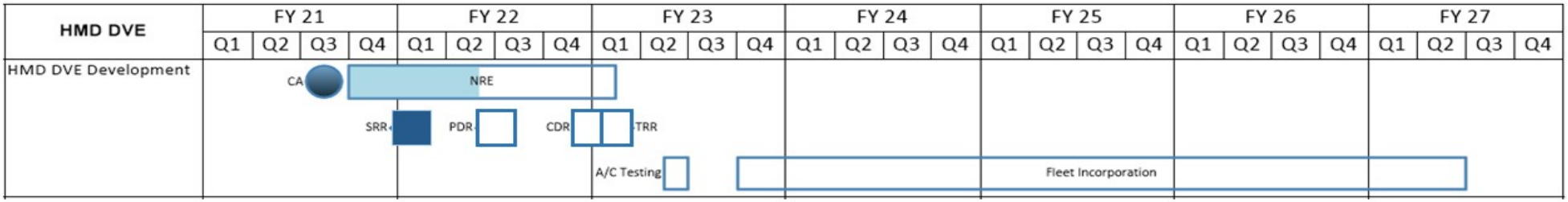

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
V-22 Hardware Development				
Reviews: Reviews: Program Design Review	3	2022	3	2022
Reviews: Reviews: Critical Design Review	2	2023	2	2023
Reviews: Reviews: Test Readiness Review	2	2024	2	2024
Reviews: Reviews: System Verification Review	2	2025	2	2025
Test & Evaluation: Development Test: Development Flight Test / Integrated Test (IT-IIID)	1	2021	1	2027
Test & Evaluation: Development Test: Rig Test	1	2021	4	2021
Test & Evaluation: Development Test: Baseline Testing	1	2021	4	2021
Test & Evaluation: Development Test: Lab Testing	2	2023	2	2024
Test & Evaluation: Development Test: Aircraft Testing	2	2024	2	2025
Test & Evaluation: Operational Evaluation: Operational Testing	1	2021	1	2027
Production Milestones: Production Milestones: Fleet Incorporation	2	2025	4	2027
V-22 CMV Development				
Reviews: Reviews: Initial Operational Capability	4	2021	4	2021
Test & Evaluation: Development Test: Developmental Test (DT)	1	2021	4	2022
Test & Evaluation: Operational Evaluation: Operational Test (OT)	2	2021	4	2021
Test & Evaluation: Operational Evaluation: Follow-On Operational Test and Evaluation	1	2023	4	2023
Production Milestones: Production Deliveries: Lot 23 APN CMV	1	2021	4	2021
Production Milestones: Production Deliveries: Lot 24 APN CMV	1	2022	4	2022
Production Milestones: Production Deliveries: Lot 25 APN CMV	1	2023	4	2023
Production Milestones: Production Deliveries: Lot 26 APN CMV	1	2024	4	2024
V-22 Electrical System Re-design				

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Reviews: Collins Aerospace: Critical Design Review	1	2021	1	2021
Reviews: Collins Aerospace: Test Readiness Review	4	2021	4	2021
Reviews: Collins Aerospace: System Verification Review	1	2023	1	2023
Test & Evaluation: Collins Aerospace: Aircraft Testing	1	2023	1	2023
Production Milestones: Collins Aerospace: Fleet Incorporation	2	2023	3	2027
Test & Evaluation: Bell Boeing: Lab Testing	1	2021	3	2021
Test & Evaluation: Bell Boeing: Aircraft Testing	3	2021	1	2023
V-22 Infrared Suppressor (IRS) Re-design				
Reviews: Reviews: Preliminary Design Review / Critical Design Review	3	2021	3	2021
Reviews: Reviews: Test Readiness Review	3	2022	3	2022
Reviews: Reviews: System Verification Review	3	2022	3	2022
Test & Evaluation: Operational Evaluation: Flight Test	3	2022	3	2022
V-22 Open System Architecture / Cyber Security				
Reviews: Reviews: Critical Design Review	1	2021	1	2021
Reviews: Reviews: Test Readiness Review	3	2021	3	2021
Reviews: Reviews: Functional Configuration Audit	2	2022	2	2022
Reviews: Reviews: Production Readiness Review	3	2022	3	2022
Reviews: Reviews: Physical Configuration Audit	2	2022	2	2022
Test & Evaluation: Development Test: Qualification Lab Testing - #1	3	2021	1	2022
Test & Evaluation: Development Test: Qualification Lab Testing - #2	1	2022	3	2022
Test & Evaluation: Development Test: Ground Test	3	2022	4	2022
Test & Evaluation: Development Test: Developmental Test	4	2022	2	2023
Test & Evaluation: Operational Evaluation: Operational Test	2	2023	3	2023
Test & Evaluation: Operational Evaluation: Flight Test	1	2021	3	2023
Production Milestones: Production Milestones: Kit Procurement	2	2023	4	2027
Production Milestones: Production Milestones: Kit Deliveries	2	2024	4	2027

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 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
V-22 Degraded Visual Environment / Helmet Mounted Display Development				
Reviews: Reviews: Systems Requirements Review	1	2022	1	2022
Reviews: Reviews: Preliminary Design Review	3	2022	3	2022
Reviews: Reviews: Critical Design Review	4	2022	4	2022
Reviews: Reviews: Test Readiness Review	1	2023	1	2023
Test & Evaluation: Operational Evaluation: Flight Test	2	2023	2	2023
Production Milestones: Production Milestones: Fleet Incorporation	4	2023	3	2027

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 0604262N / *V-22A*	Project (Number/Name) 3090 / *V-22 Improvement Program*	

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
3090: *V-22 Improvement Program*	0.000	11.512	14.926	27.226	-	27.226	10.007	76.439	79.212	80.597	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The V-22 Osprey provides a dual-piloted, multi-engine, Vertical/Short Takeoff and Landing, medium lift aircraft for worldwide combat, combat support, combat service support, and Special Operations missions. V-22 Product Improvements addresses requirements necessary to meet the aircraft capabilities specified in the approved Capability Development Document. Efforts included in this Project provide near and long-term improvements to the fleet, addressing deficiencies, systems safety, obsolescence, readiness, reliability, supportability, and relevance in any designated battlespace. Efforts include hardware and software development associated with increased performance capability, avionics upgrades and improvements, increased system processing capability, and the integration with other organic and non-organic systems.

FY 2023 continues Hardware Development in support of V-22 Block upgrades, electrical system capacity efforts, Time on Wing/Reliability Improvements efforts, Aircraft Mission Maneuvering Envelope Expansion and Safety Improvement efforts. Continues engineering, logistics, flight test, flight test support and address the correction of deficiencies and obsolescence.

FY 2023 continues Flight Control System re-design, which will address obsolescence issues, mitigate deficiencies and provide improved capabilities through hardware and software upgrades.

FY 2023 continues Open Systems Architecture/Cyber Security research, requirements analysis and development of obsolescence mitigation solutions for aging V-22 Avionics systems to overcome obsolete hardware availability. Replacement systems will be designed to provide compatibility with all legacy interfaces and functions while resolving deficiencies, meeting expanding needs, and leveraging emerging hardware and software technologies to mitigate future obsolescence.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: V-22 Airframe Hardware Development	0.000	6.049	7.374	0.000	7.374
Articles:	-	-	-	-	-
Description: The V-22 Airframe Hardware Development funds development efforts in support of V-22 Block upgrades, electrical system capacity efforts, Time on Wing/Reliability Improvements efforts, Aircraft Mission Maneuvering Envelope Expansion, and Safety Improvement efforts. Continues engineering, logistics, flight test, flight test support, and addresses the correction of deficiencies and obsolescence.					
FY 2022 Plans:					

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 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continues development in support of V-22 Block upgrades, Time on Wing/Reliability Improvements such as testing of Additive Manufacturing processes for selected V-22 components, Aircraft Mission Maneuvering Envelope Expansion, and Safety Improvement efforts such as Condition Based Maintenance. Continues engineering, logistics, flight test, flight test support, and addresses correction of deficiencies and obsolescence efforts. Continues reliability improvement efforts as well as re-design efforts to correct critical Reliability, Maintainability, and Availability issues in support of readiness such as Pitch Change Link Bearing re-design. ***FY 2023 Base Plans:*** Continues development in support of V-22 Block upgrades, Time on Wing/Reliability Improvements such as testing of Additive Manufacturing processes for selected V-22 components, Aircraft Mission Maneuvering Envelope Expansion, and Safety Improvement efforts such as Condition Based Maintenance. Continues engineering, logistics, flight test, flight test support, and addresses correction of deficiencies and obsolescence efforts. Continues reliability improvement efforts as well as re-design efforts to correct critical Reliability, Maintainability, and Availability issues in support of readiness such as Pitch Change Link Bearing re-design. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Hardware Development supports the additional development requirements for the Pitch Change Link re-design effort and Flight testing.					
Title: V-22 Flight Control System (FCS) Re-Design	11.512	2.358	13.101	0.000	13.101
Articles:	-	-	-	-	-
Description: The FCS re-design will address obsolescence issues, mitigate current system deficiencies and provide a foundation for improved aircraft handling qualities through hardware and software upgrades. The re-design will correct critical Reliability and Maintainability issues to increase mission effectiveness, provide additional safety, and improve readiness. ***FY 2022 Plans:*** Continues hardware and software architecture upgrades to mitigate obsolescence and data throughput constraints to include Flight Control Computer, Cockpit Interface Unit, and Flight Test Interface Panel. Upgrade software language in the Cross Channel Data Link and Flight Control Computer Operational Flight Program from assembly language to a Higher Order Language for future software maintenance efficiency and capability. Begin					

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 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Phase 1 Non-Recurring Engineering to include the Systems Requirements Review and the Preliminary Design Review. ***FY 2023 Base Plans:*** Continues development of hardware and software architecture upgrades to mitigate obsolescence and data throughput constraints to include Flight Control Computer, Cockpit Interface Unit, and Flight Test Interface Panel. Software language upgrade development in the Cross Channel Data Link and Flight Control Computer Operational Flight program from assembly language to a Higher Order Language for future software maintenance efficiency and capability. Continues Non-Recurring Engineering to complete the Critical Design Review. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Flight Control System Re-design is due to the ramp up of Non-Recurring Engineering.					
Title: V-22 Open Systems Architecture/Cyber Security	0.000	5.557	5.759	0.000	5.759
Articles:	-	-	-	-	-
Description: Open System Architecture/Cyber Security provides non-proprietary hardware and software agnostic architecture and interfaces, focused on enhancing survivability, maturation of software and hardware modularity, rapid technology and capability insertion, obsolescence mitigation, and maturation of aircraft interfaces to support robust, Cyber-Resilient interoperability and data routing/transfers. The project includes risk reduction and development efforts such as Modular Avionics Architecture, Cyber Security Implementation, and Cyber Safe Flight Control improvements for Control Display Units, Standby Flight Indicators, Keyboard Unit, Engine Instrument Crew Alerting System, Remote Frequency Indicator Selector, Heads-Up Displays, and Flight Director Panel. Provides integrated solutions for Mission Computer Obsolescence mitigation, functional upgrades, Ethernet backbone (High speed Ethernet communication), Ethernet switches and routing functions to enable distributed processing. Joint Avionics Reconfigurable Virtual Information System (JARVIS) along with associated JARVI modules and Ethernet connectivity for distributed modular processing are the current open system architecture efforts being developed. ***FY 2022 Plans:***					

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 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Continues requirement analysis, integration studies, risk reduction testing and developmental efforts for Modular Avionics Architecture, Cockpit Displays and Center Console obsolescence mitigation, Ethernet backbone, and Ethernet switches and routing functions. Begin the re-design of the Engine Instrument Crew Alerting System. ***FY 2023 Base Plans:*** Continues requirements analysis, integration studies, integrated designs, risk reduction testing and developmental efforts for Modular Avionics Architecture, Cockpit Avionics obsolescence mitigation, Ethernet backbone, Ethernet switches and routing functions. Begin the Cockpit Avionics re-design. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Open Systems Architecture/Cyber Security supports the additional development requirements for the Cockpit Avionics re-design effort.					
Title: V-22 Development Support, Test, and Evaluation ***Articles:*** ***Description:*** Funds Government Engineering and Contractor Engineering, including Follow-On Test & Evaluation (FOT&E), Developmental Test & Engineering (DT&E), and Operational Test & Evaluation (OT&E) for the V-22 Flight events. Perform Government oversight. Execute test program risk reduction efforts. ***FY 2022 Plans:*** Funds provided for continued support of FOT&E, DT&E and OT&E to include vehicle flight control updates, mission systems software and hardware updates, and high density altitude envelope expansion/verification. ***FY 2023 Base Plans:*** Funds provided for continued support of FOT&E, DT&E and OT&E to include vehicle flight control updates, mission systems software and hardware updates, and high density altitude envelope expansion/verification. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Increase in FY 2023 for Development Support, Test, and Evaluation is due to civilian pay and NWCF rate adjustments.	0.000 -	0.962 -	0.992 -	0.000 -	0.992 -
Accomplishments/Planned Programs Subtotals	11.512	14.926	27.226	0.000	27.226

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 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• APN 0164: *V-22*	1,263.314	1,103.574	31.795	-	31.795	12.692	0.000	0.000	0.000	872.146	35,559.651
• APN 0590: *V-22 Series*	320.584	310.512	207.621	-	207.621	246.609	225.100	228.349	275.302	1,650.614	5,550.288
• APN 0605/J0164: *V-22 Initial Spares*	6.238	25.627	26.461	-	26.461	26.276	27.066	0.000	0.000	377.899	489.567
• RDTE 1160403BB: *CV-22 Special Operations, Aviation Systems*	16.773	6.932	0.000	-	0.000	0.000	9.727	19.064	0.000	Continuing	Continuing
• RDTE BA07 0401318F: *CV-22 USAF BA07*	18.385	17.189	17.253	-	17.253	17.518	15.829	16.152	0.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

V-22 Product Improvements will include design and engineering studies, cost-benefit analyses, and risk-reduction efforts to address improvements for readiness, aircraft capability, safety, component reliability, maintainability, software, and obsolescence.

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 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 Airframe Hardware Development	Various	Various : Various	0.000	0.000		6.049	Jan 2022	7.374	Jan 2023	-		7.374	Continuing	Continuing	Continuing
V-22 Flight Control System Re-Design	SS/BOA	Bell Boeing : Ridley Park, PA	0.000	11.512	Aug 2021	2.358	Jun 2022	13.101	Jun 2023	-		13.101	Continuing	Continuing	Continuing
V-22 Open Systems Architecture/Cyber Security	Various	Various : Various	0.000	0.000		5.557	Mar 2022	5.759	Mar 2023	-		5.759	Continuing	Continuing	Continuing
		Subtotal	0.000	11.512		13.964		26.234		-		26.234	Continuing	Continuing	N/A

Remarks

Hardware Development: Increase is due to the additional development requirements for the Pitch Change Link re-design effort and Flight testing.
Flight Control System: Increase is due to the ramp up of Non-Recurring Engineering.
Open Systems Architecture/Cyber Security: Increase is due to the additional development requirements for the Cockpit Avionics re-design effort.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 Gov't Engineering Support	WR	NAWCAD : Pax River, MD	0.000	0.000	Nov 2020	0.696	Nov 2021	0.721	Nov 2022	-		0.721	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.696		0.721		-		0.721	Continuing	Continuing	N/A

Remarks

Government Engineering Support: Increase is due to civilian pay and NWCF rate adjustments.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 Program Mgmt Support	WR	NAWCAD : Pax River, MD	0.000	0.000	Nov 2020	0.256	Nov 2021	0.261	Nov 2022	-		0.261	Continuing	Continuing	Continuing
V-22 Travel	WR	Various : Various	0.000	0.000	Sep 2021	0.010	Sep 2022	0.010	Sep 2023	-		0.010	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.266		0.271		-		0.271	Continuing	Continuing	N/A

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 0604262N / *V-22A*	Project (Number/Name) 3090 / *V-22 Improvement Program*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks															
Program Mgmt Support: Increase is due to inflation.															

	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	0.000	11.512		14.926		27.226		-		27.226	Continuing	Continuing	N/A

Remarks

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 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

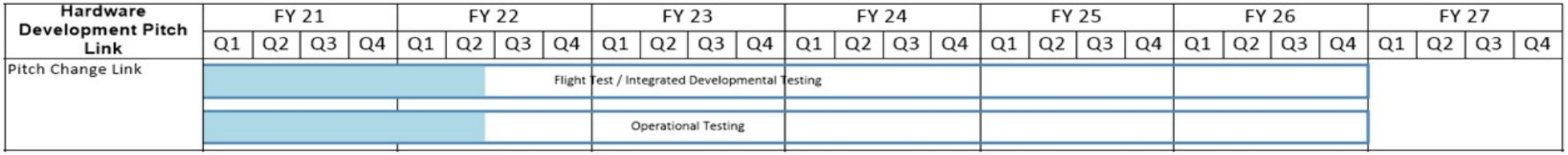

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

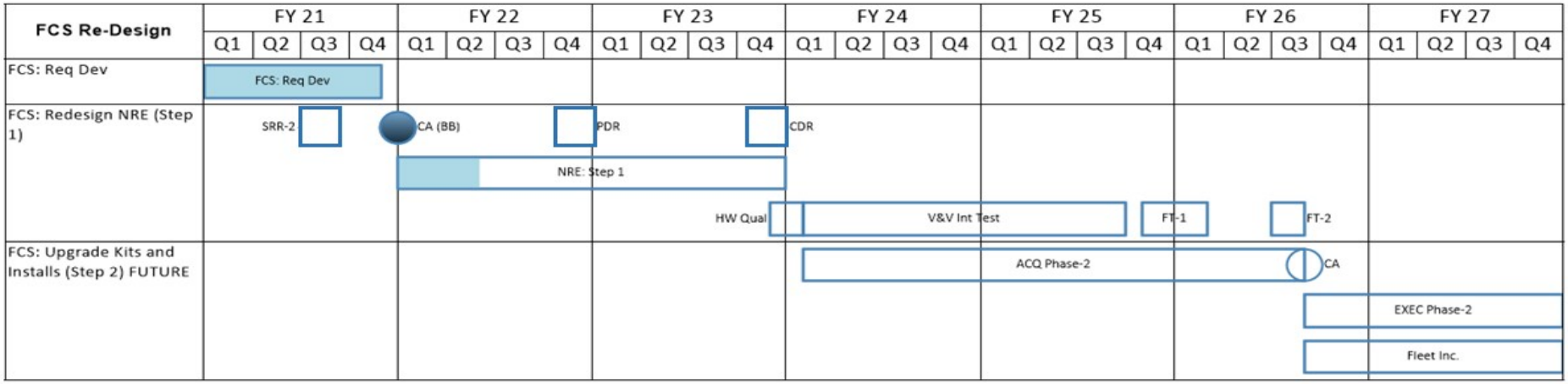

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

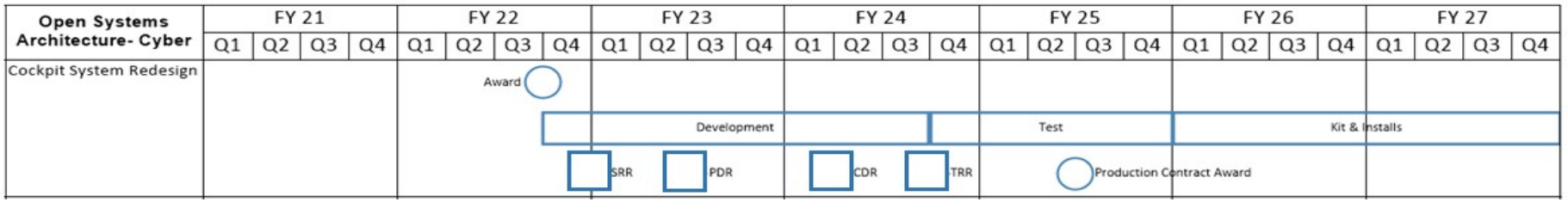

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 3090 / *V-22 Improvement Program*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Hardware Development				
Test & Evaluation: Developmental Testing: Flight Test / Integrated Development Testing	1	2021	4	2026
Operational Evaluation: Operational Testing	1	2021	4	2026
Flight Control System Re-Design				
Reviews: Reviews: System Requirements Review	3	2021	3	2021
Reviews: Reviews: Preliminary Design Review	4	2022	4	2022
Reviews: Reviews: Critical Design Review	4	2023	4	2023
Test & Evaluation: Operational Evaluation: V&V Int Testing	1	2024	3	2025
Test & Evaluation: Operational Evaluation: Flight Test - 1	4	2025	1	2026
Test & Evaluation: Operational Evaluation: Flight Test - 2	3	2026	3	2026
Production Milestones: Production Milestones: Fleet Incorporation	4	2026	4	2027
Open Systems Architecture / Cyber Security				
Reviews: Reviews: Systems Requirements Review	4	2022	4	2022
Reviews: Reviews: Preliminary Design Review	3	2023	3	2023
Reviews: Reviews: Critical Design Review	2	2024	2	2024
Reviews: Reviews: Test Readiness Review	4	2024	4	2024
Test & Evaluation: Developmental Testing: Developmental Testing	4	2024	4	2025
Production Milestones: Production Milestones: Kits and Installs	1	2026	4	2027

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 0604262N / *V-22A*	Project (Number/Name) 9999 / *Congressional Adds*	

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: *Congressional Adds*	0.000	0.000	4.250	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.250
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Develop Air-Oil heat exchanger that is resistant to fouling and easy to clean on-wing for V-22 operations in sand/dust environment. Fouled heat exchangers can lead to gearbox overheat in flight and potential for catastrophic consequences. New oil cooler will reduce maintenance burden and improve performance in sand/dust environment to prevent overheating of gearbox, hydraulic, and generator oil.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022
Congressional Add: V-22 oil coolers	0.000	4.250
FY 2021 Accomplishments: N/A		
FY 2022 Plans: Complete development, qualification test and development flight test		
Congressional Adds Subtotals	0.000	4.250

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Continue with Small Business Innovative Research (SBIR).

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 0604262N / *V-22A*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 Oil Coolers	SS/FFP	International Mezzo Technologies : Baton Rouge, LA	0.000	0.000		4.000	Dec 2022	0.000		-		0.000	0.000	4.000	4.000
		Subtotal	0.000	0.000		4.000		0.000		-		0.000	0.000	4.000	N/A

Remarks

Oil Coolers - FY23 decrease is due to the completion of the development effort.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
V-22 MV Govt Engineering Sppt	WR	Various : Pax River, MD	0.000	0.000		0.250	Sep 2022	0.000		-		0.000	0.000	0.250	-
		Subtotal	0.000	0.000		0.250		0.000		-		0.000	0.000	0.250	N/A

Remarks

MV Government Engineering Support - FY23 decrease is due to the completion of the development effort.

	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	0.000	0.000		4.250		0.000		-		0.000	0.000	4.250	N/A

Remarks

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 0604262N / *V-22A*	**Project (Number/Name)** 9999 / *Congressional Adds*

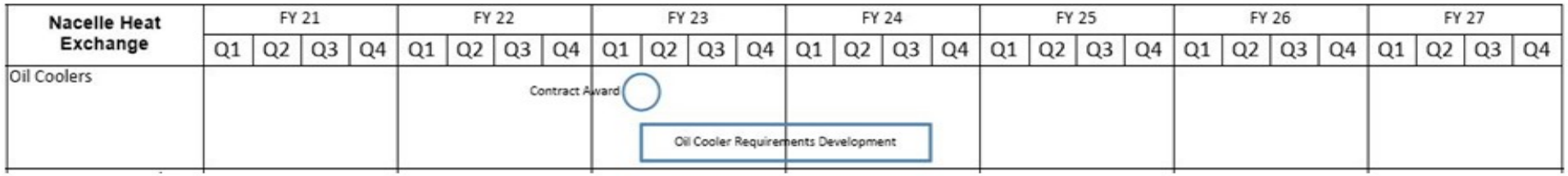

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Development Milestones				
V-22 Oil Coolers: Contract Award	1	2023	1	2023