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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2022 Navy **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	9,616.140	184.443	132.427	107.984	-	107.984	-	-	-	-	-	-
1425: V-22	9,616.140	171.555	118.475	86.553	-	86.553	-	-	-	-	-	-
3090: <i>V-22 Improvement Program</i>	0.000	0.000	13.952	21.431	-	21.431	-	-	-	-	-	-
9999: <i>Congressional Adds</i>	0.000	12.888	0.000	0.000	-	0.000	-	-	-	-	-	-

**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 (COD) 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 (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 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.

**Note:**

The first two CMV production aircraft were test aircraft. They were delivered in January/May 2020 to Patuxent River to support development testing. Operational testing (OT) began in January 2021 and was conducted as part of a carrier air wing work-up prior to deployment. OT is ongoing and focused on assessing the effectiveness and suitability of the CMV-22 as the COD platform in the carrier strike group. There is no Milestone C, because CMV-22 is being executed as an engineering change proposal (ECP) to V-22 Block C. Initial Operational Capability for CMV-22 is 4th Qtr FY 2021.

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<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Previous President's Budget	191.235	132.624	139.786	-	139.786
Current President's Budget	184.443	132.427	107.984	-	107.984
Total Adjustments	-6.792	-0.197	-31.802	-	-31.802
• Congressional General Reductions	-	-0.197			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.368	0.000			
• SBIR/STTR Transfer	-6.424	0.000			
• Program Adjustments	0.000	0.000	-19.571	-	-19.571
• Rate/Misc Adjustments	0.000	0.000	-12.231	-	-12.231

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

**Project:** 9999: *Congressional Adds*

    Congressional Add: *Common Lightweight Cargo System*

    Congressional Add: *Active vibration control system*

Congressional Add Subtotals for Project: 9999

Congressional Add Totals for all Projects

	<b>FY 2020</b>	<b>FY 2021</b>
	8.061	0.000
	4.827	0.000
	12.888	0.000
	12.888	0.000

**Change Summary Explanation**

FY 2022 net \$31.802M decrease from the FY 2021 President's Budget is due to the shift of funding for USMC higher priorities.

Schedule:

Project Unit 1425:

1. Hardware Development - IIS/EAPS 2.0 schedule updated to reflect program delay due to inlet design complexities and requisite design changes to meet Engine Air Particle Separator (EAPS) environmental performance requirements. Rig Test was added as it was missing from the schedule.
2. CMV Development - CMV ECP was extended to 4th Qtr FY 2022 due to delay in providing a qualified fuel tank and OT moved from 4th Qtr FY 2020 to 2nd Qtr FY 2021 to correct an error on the schedule.
3. Electrical System Re-design - Schedule updated to reflect delay in meeting preliminary design review entry/exit criteria for the Constant Frequency Generator (CFG)/Generator Control Unit (GCU) Re-design. Test Readiness Review and System Verification Review added under Collins Aerospace (replaced UTAS). Lab Testing and Aircraft Testing added under Bell Boeing. TIM deleted as it is no longer required.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2022 Navy		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	
<p>4. Infrared Suppressor (IRS) Schedule - Schedule updated to reflect program delay due to structural analysis completion and down selection from three to one design. System Requirements Review #2 deleted as it is no longer required.</p> <p>5. Open Systems Architecture/Cyber Security - Schedule updated to reflect delay in delivery of material for test assets required for developmental testing.</p> <p>6. Degraded Visual Environment/Helmet Mounted Display - Schedule updated to reflect current program schedule working toward source selection and competitive contract award. The lead time for kits and installs is shorter than originally planned. Kits can be procured and installed in the same Fiscal Year.</p> <p>Schedule: Project Unit 3090:</p> <p>1. Flight Control System (FCS) - Schedule updated to reflect a Fixed Price Incentive Fee contract award.</p> <p>2. Hardware Development - New Schedule added.</p> <p>3. Open Systems Architecture/Cyber Security - New Schedule added.</p> <p>Schedule: Project Unit 9999:</p> <p>1. Active Vibration Control System - Schedule updated to reflect delay in contract award due to an incomplete proposal. Critical Design Review added to the schedule.</p>		

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Navy **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A				<b>Project (Number/Name)</b> 1425 / V-22			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
1425: V-22	9,616.140	171.555	118.475	86.553	-	86.553	-	-	-	-	-	-
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 and the Block A 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 2022 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 development of V-22 Integrated Aircraft Survivability Equipment (IASE) to include correcting deficiencies, radar warning system, integration with an upgraded missile warning and active infrared countermeasure system. Continues rotor blade tabs, defensive weapons capabilities and providing integrated threat warning information on the aircrafts main flight displays. Continues correcting deficiencies on the current Engine Air Particle Separator (EAPS) and Enhanced Standby Flight Instrument (ESFI).

FY 2022 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.

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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22
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FY 2022 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, Electromagnetic Environment Effects testing, HF radio testing, Carrier Suitability and integration testing. CMV-22 will continue to support development efforts such as: EAPS, Infrared Suppressor (IRS) re-design, Center Console re-design, and Modular Avionics/Cyber Security Implementation.

FY 2022 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. This effort will design, develop, validate and verify engineering solutions to improve (1) the Constant Frequency Generator (CFG), (2) other frequency generators and (3) all associated electrical system interfaces.

FY 2022 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. Continue risk reduction and development efforts such as cyber-resilient interoperability, Modular Avionics/ Cyber Security Implementation, Cyber Safe Flight Control improvements, along with Control Display Unit (CDU) and Center Console re-design. Continues 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 hardware and software technologies to mitigate future obsolescence.

FY 2022 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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<b>Title:</b> V-22 Airframe Hardware Development	30.485	28.784	22.877	0.000	22.877
<b>Articles:</b>	-	-	-	-	-
<b>Description:</b> 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 development					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy	<b>Date:</b> May 2021
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**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>of V-22 IASE by correcting deficiencies, radar warning system, integration with an upgraded missile warning and active infrared countermeasure system, cockpit interface units, electrical power system, rotor blade tabs, defensive weapons capabilities, mission system upgrades, and providing integrated threat warning information on the aircraft main flight displays. 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.</p> <p><b>FY 2021 Plans:</b> Continue V-22 development efforts including: rotor blade tabs, and MAGR2K. Continue V-22 software development efforts. Continue 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 Cockpit Engine Health Indicator and Condition Based Maintenance. Continue engineering, logistics, flight test, flight test support, address 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 Primary Lightning Control Unit, Flight Director Panel and ESFI.</p> <p><b>FY 2022 Base Plans:</b> 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.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>					

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Decrease in FY 2022 for Airframe Hardware Development is due to the ramp down of Airframe Development efforts as the program transitions out of the EMD phase and the transfer of Pitch Change Link re-design to PU 3090.					
<p><b>Title:</b> V-22 Propulsion / Mission Care Hardware Development</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> 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.</p> <p><b>FY 2021 Plans:</b> Funds continue for 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.</p> <p><b>FY 2022 Base Plans:</b> 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.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease in FY 2022 for Propulsion/Mission Care Hardware Development is due to a reduction in flight/engine hours required for the V-22 propulsion system development efforts at the Patuxent River squadron.</p>	1.446	2.219	1.849	0.000	1.849
	-	-	-	-	-
<p><b>Title:</b> V-22 Digital Interoperability</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> Digital Interoperability (DI) is the USMC Aviation wide implementation of gateway and software defined radios, such as Software Reprogrammable Payload, capable of migration to advanced waveforms and payloads, providing enhanced digital connectivity between forces using dissimilar waveforms and/or protocols. DI will enable fleet integration of new capability through the use of tablets with custom applications. DI is also envisioned to include logistics tracking (cargo and personnel) with the use of Radio Frequency Identification technology, advanced Electronic Warfare/Cyber capability, and threat data capturing/off-boarding.</p>	30.804	0.000	0.000	0.000	0.000
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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22
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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
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**FY 2021 Plans:**

N/A

**FY 2022 Base Plans:**

N/A

**FY 2022 OCO Plans:**

N/A

**Title:** V-22 CMV Development

41.677	29.949	9.999	0.000	9.999
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**Articles:**

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**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 IASE development efforts to include correcting deficiencies of the current EAPS, Electrical System re-design, IRS re-design, Center Console re-design, Flight Control System (FCS) re-design and Modular Avionics/Cyber Security Implementation.

**FY 2021 Plans:**

Continues funding for the V-22 CMV 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 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, EAPS, IRS re-design, and Cyber Security implementation. Continue the test instrumentation design and planning for the CMV-22 aircraft. 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

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<p>BLOS. Continue the spiral development of the Required Navigation Performance / Area Navigation capability to upgrade to full precision approach capability and coupled approach.</p> <p><b>FY 2022 Base Plans:</b> Begin integration of the Joint Precision Automated Landing System. 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.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease in FY 2022 for CMV Development is in accordance with planned program execution. Development efforts decrease as program moves into the Production phase.</p>					
<p><b>Title:</b> V-22 Electrical System Re-design</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> 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 CFG, (2) other frequency generators and (3) all associated electrical system interfaces.</p> <p><b>FY 2021 Plans:</b> Continues Electrical System re-design and reliability improvement efforts with the design, development, validation and verification of engineering solutions to improve the V-22 Constant Frequency/Generator Control Unit (CFG/GCU) hardware.</p> <p><b>FY 2022 Base Plans:</b> 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.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>	8.372	2.558	0.608	0.000	0.608
	-	-	-	-	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Decrease in FY 2022 for Electrical System re-design is due to developmental efforts that completed in FY 2021.					
<p><b>Title:</b> V-22 Infrared Suppressor (IRS) Re-design</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> 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.</p> <p><b>FY 2021 Plans:</b> Funding completes the development and begins 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.</p> <p><b>FY 2022 Base Plans:</b> N/A</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease in FY 2022 for IRS re-design is due to the effort being completed.</p>	1.137	0.304	0.000	0.000	0.000
	-	-	-	-	-
<p><b>Title:</b> V-22 Development Support, Test and Evaluation</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> Funds Government Engineering and Contractor Engineering, including Follow-On Test &amp; Evaluation (FOT&amp;E), Developmental Test &amp; Engineering (DT&amp;E), and Operational Test &amp; Evaluation (OT&amp;E) for the V-22 flight events. Perform Government oversight. Execute test program risk reduction efforts.</p> <p><b>FY 2021 Plans:</b> Funds provided for continued support of FOT&amp;E, DT&amp;E and OT&amp;E to include vehicle system operating software, inlet distortion, structural fatigue, envelope expansion, software airframe loads, Integrated Aircraft Survivability Equipment, Traffic Collision Avoidance System, Bonded Blade Tabs, Refueling Envelope Expansion, Sea Trials, and CMV Developmental Test and Communications upgrades.</p> <p><b>FY 2022 Base Plans:</b> Funds provided for continued support of FOT&amp;E, DT&amp;E and OT&amp;E to include vehicle flight control software updates, mission systems software and hardware updates, inlet distortion, environmental control systems,</p>	43.003	37.747	26.697	0.000	26.697
	-	-	-	-	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
structural fatigue, high density altitude envelope expansion, Nacelle Improvements, IASE, Sea Trials, communication systems, navigation systems, weapons systems and CMV Developmental Test and Communications upgrades.  <b>FY 2022 OCO Plans:</b> N/A  <b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease in FY 2022 is due to the ramp down of DT&E efforts as the program transitions out of the EMD phase.					
<b>Title:</b> V-22 Open Systems Architecture / Cyber Security  <b>Description:</b> 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/transfer. The project also includes risk reduction and development efforts such as Modular Avionics Architecture, Cyber Security Implementation, Cyber Safe Flight Control improvements, Cockpit Displays and Center Console re-design (CDU), Keyboard Unit, Engine Instrument Crew Alerting System, and Remote Frequency Indicator Selector re-design, Mission Computer Obsolescence mitigation, functional upgrades, Ethernet backbone (High speed Ethernet communication) and 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.  <b>FY 2021 Plans:</b> Continues requirement analysis, integration studies, risk reduction and developmental efforts for Modular Avionics Architecture, Control Display Unit obsolescence mitigation and Ethernet backbone. JARVIS is the current open system architecture effort being developed.  <b>FY 2022 Base Plans:</b> 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	12.482	11.529	11.760	0.000	11.760
<b>Articles:</b>	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<p>functions. Continues development of JARVIS Mission Computer System, associated JARVI modules, and Ethernet switches and routing functions for distributed modular processing.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase in FY 2022 for Open Systems Architecture/Cyber Security supports the additional developmental requirements for the Ethernet switches and routing functions.</p>					
<p><b>Title:</b> V-22 Degraded Visual Environment/Helmet Mounted Display (DVE/HMD)</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> 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.</p> <p><b>FY 2021 Plans:</b> Continues DVE developmental efforts to improve safety when landing in obscured tactical zones and will include requirements analysis, risk reduction and developmental efforts for the digital HMD and EVA interfaces.</p> <p><b>FY 2022 Base Plans:</b> 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 Critical Design Review. Begin qualification testing.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase in FY 2022 for DVE/HMD is due to the start of the Non-Recurring Engineering phase of the project.</p>	2.149	5.385	12.763	0.000	12.763
	-	-	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	171.555	118.475	86.553	0.000	86.553

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22

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

Line Item	FY 2020	FY 2021	FY 2022	FY 2022	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Cost To	
			Base	OCO	Total					Complete	Total Cost
• APN 0164: V-22	1,111.314	1,263.315	791.263	-	791.263	-	-	-	-	-	-
• APN 0590: V-22 Series	325.278	320.989	312.835	-	312.835	-	-	-	-	-	-
• APN 0605/J0164: V-22 Initial Spares	4.247	3.328	25.627	-	25.627	-	-	-	-	-	-
• RDTE 1160403BB: CV-22 Special Operations, Aviation Systems	23.931	13.623	6.932	-	6.932	-	-	-	-	-	-
• RDTE BA07 0401318F: CV-22 USAF BA07	17.355	18.385	17.270	-	17.270	-	-	-	-	-	-

**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.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
V-22 Airframe Hardware Dev	Various	Various : Various	119.539	30.485	Jan 2020	28.784	Jan 2021	22.877	Jan 2022	-		22.877	-	-	-
V-22 Propulsion Hardware Dev	SS/CPIF	Rolls-Royce Corp. : Indianapolis, IN	197.868	1.446	Nov 2019	2.219	Nov 2020	1.849	Nov 2021	-		1.849	-	-	-
V-22 Digital Interoperability	Various	Various : Various	57.899	30.804	Mar 2020	0.000		0.000		-		0.000	-	-	-
V-22 CMV Development	Various	Various : Various	153.736	41.677	Jan 2020	29.949	Jan 2021	9.999	Jan 2022	-		9.999	-	-	-
V-22 Electrical System Re-Design	SS/FFP	Hamilton Sundstrand Corp : Rockford, IL	6.788	8.372	Mar 2020	2.558	Mar 2021	0.608	Mar 2022	-		0.608	-	-	-
V-22 IRS Re-design	SS/CPFF	Honeywell : Tempe, AZ	4.893	1.137	Apr 2020	0.304	May 2021	0.000		-		0.000	-	-	-
V-22 Open Systems Architecture / Cyber Security	Various	Various : Various	0.000	12.482	Mar 2020	11.529	Mar 2021	11.760	Mar 2022	-		11.760	-	-	-
V-22 Degraded Visual Environment/Helmet Mounted Display	C/CPIF	Various : Various	0.000	2.149	Mar 2020	5.385	Jul 2021	12.763	Jul 2022	-		12.763	-	-	-
Prior year Prod Dev no longer funded in FYDP	Various	Various : Various	5,213.896	0.000		0.000		0.000		-		0.000	-	-	-
<b>Subtotal</b>			5,754.619	128.552		80.728		59.856		-		59.856	-	-	N/A

**Remarks**  
 Airframe Hardware Development: Decrease is due to the ramp down of Airframe Development efforts as the program transitions out of the EMD phase.  
 Propulsion Hardware Development: Decrease is due to a reduction in flight/engine hours required for the V-22 propulsion system development efforts at the Patuxent River squadron.  
 CMV Development: Decrease supports the planned program execution as developmental efforts decrease and the program is in Production phase.  
 Electrical System Re-design: Decrease is due to developmental efforts that completed in FY 2021.  
 IRS Re-design: Decrease is due to program completion.  
 Open Systems Architecture: Increase is due to additional development requirements for the Ethernet switches and routing functions.  
 Degraded Visual Environment/Helmet Mounted Display: Increase is due to the start of the Non-Recurring Engineering phase of the project and this safety improvement is a Deputy Commandant for Aviation priority.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22
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<b>Support (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
V-22 MV Govt Engineering Sppt	WR	Various : Pax River, MD	1,121.099	3.333	Nov 2019	3.487	Nov 2020	3.535	Nov 2021	-		3.535	-	-	-
V-22 CMV Govt Engineering Sppt	WR	Various : Pax River, MD	20.400	18.185	Nov 2019	4.979	Nov 2020	4.539	Nov 2021	-		4.539	-	-	-
Prior Year Support no longer funded in the FYDP	Various	Various : Various	189.718	0.000		0.000		0.000		-		0.000	-	-	-
<b>Subtotal</b>			1,331.217	21.518		8.466		8.074		-		8.074	-	-	N/A

**Remarks**  
 MV Government Engineering Support: Increase is due to inflation.  
 CMV Government Engineering Support: Decrease is due to Manpower and NWCF Rate Adjustments.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
V-22 Dev Test & Evaluation	WR	NAWCAD : Pax River, MD	1,075.518	9.395	Nov 2019	16.894	Nov 2020	10.232	Nov 2021	-		10.232	-	-	-
V-22 Operational Test & Evaluation	WR	OT&E Force : Norfolk, VA	64.541	2.041	Dec 2019	2.826	Dec 2020	2.883	Dec 2021	-		2.883	-	-	-
V-22 CMV Dev Test & Evaluation	WR	NAWCAD : Pax River, MD	6.300	4.000	Nov 2019	5.000	Nov 2020	1.900	Nov 2021	-		1.900	-	-	-
V-22 CMV Operational Test & Evaluation	WR	OT&E Force : Norfolk, VA	2.357	1.944	Dec 2019	2.000	Dec 2020	1.000	Dec 2021	-		1.000	-	-	-
Prior Year T & E no longer funded in the FYDP	Various	Various : Various	48.200	0.000		0.000		0.000		-		0.000	-	-	-
<b>Subtotal</b>			1,196.916	17.380		26.720		16.015		-		16.015	-	-	N/A

**Remarks**  
 Development Test & Evaluation: Decrease is due to the ramp down of Developmental Support, Test, and Evaluation efforts as the program transitions out of the EMD phase.  
 Operational Test & Evaluation: Increase is due to inflation.  
 CMV DT&E: Decrease is due to completion of developmental test events (Electromagnetic Environment Effects, flying qualities, and performance) that enabled operational test to occur.  
 CMV OT&E: Decrease is due to completion of OT test period.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22
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<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
V-22 Engineering Tech Sppt	Various	Various : Various	1,049.204	0.881	Dec 2019	0.737	Dec 2020	0.752	Dec 2021	-		0.752	-	-	-
V-22 Management Sppt Svc	Various	Various : Various	158.694	0.296	Jan 2020	0.280	Jan 2021	0.286	Jan 2022	-		0.286	-	-	-
V-22 Program Mgmt Support	WR	NAWCAD : Pax River, MD	66.495	1.757	Nov 2019	0.856	Nov 2020	0.873	Nov 2021	-		0.873	-	-	-
V-22 CMV Engineering Tech Sppt	Various	Various : Various	0.469	0.953	Jan 2020	0.443	Jan 2021	0.452	Jan 2022	-		0.452	-	-	-
V-22 Travel	WR	Various : Various	17.208	0.158	Sep 2020	0.185	Sep 2021	0.185	Sep 2022	-		0.185	-	-	-
V-22 CMV Travel	WR	Various : Various	0.231	0.060	Sep 2020	0.060	Sep 2021	0.060	Sep 2022	-		0.060	-	-	-
Prior Year Mgmt Svcs no longer funded in the FYDP	Various	Various : Various	41.087	0.000		0.000		0.000		-		0.000	-	-	-
<b>Subtotal</b>			1,333.388	4.105		2.561		2.608		-		2.608	-	-	N/A

**Remarks**  
All increases to Management Services in FY 2022 are due to inflation.

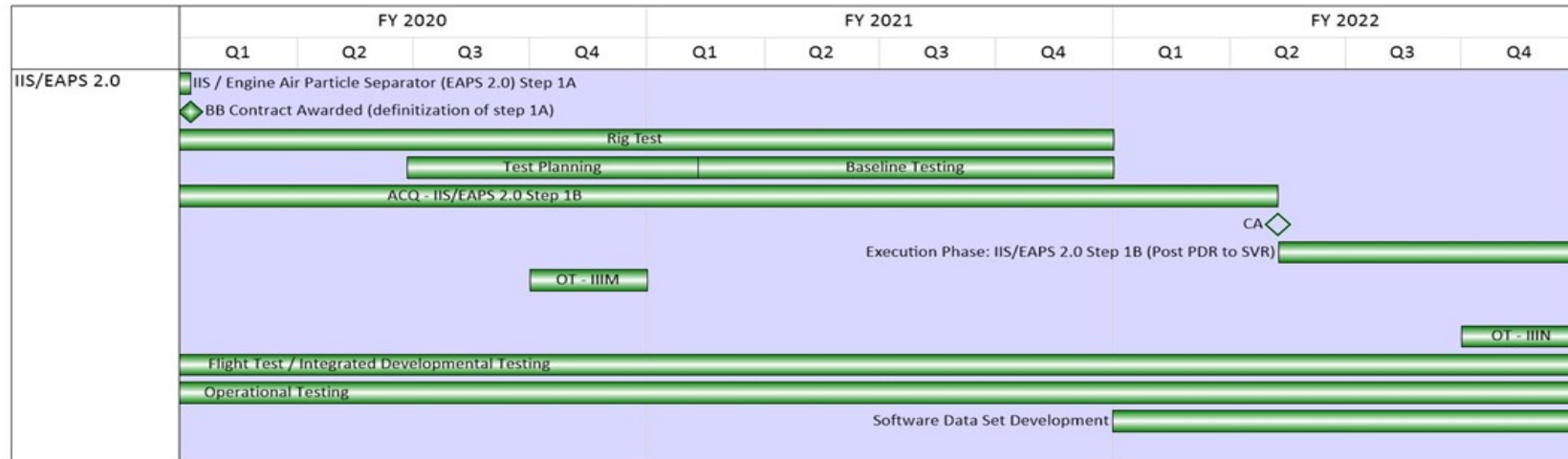
	<b>Prior Years</b>	<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>										
<b>Project Cost Totals</b>											9,616.140	171.555		118.475		86.553		-		86.553	-	-	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22

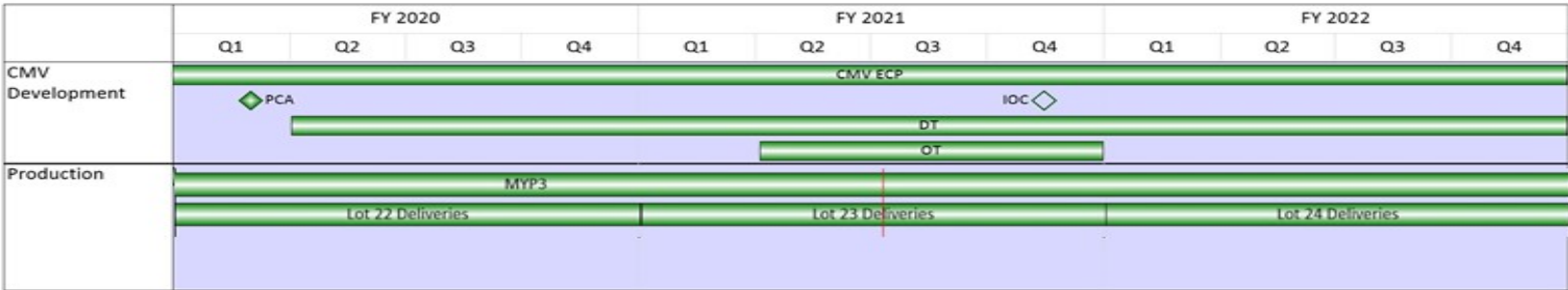
**Airframe Hardware Development**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22

**CMV Development**

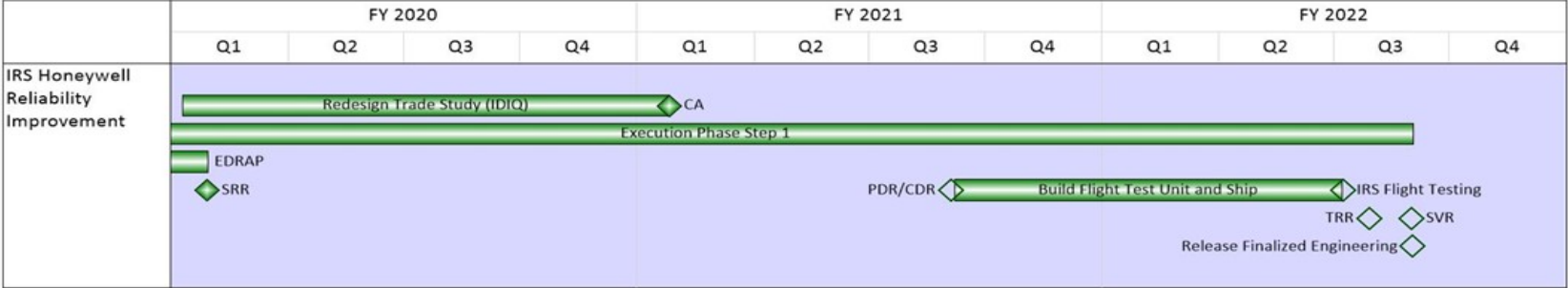




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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22

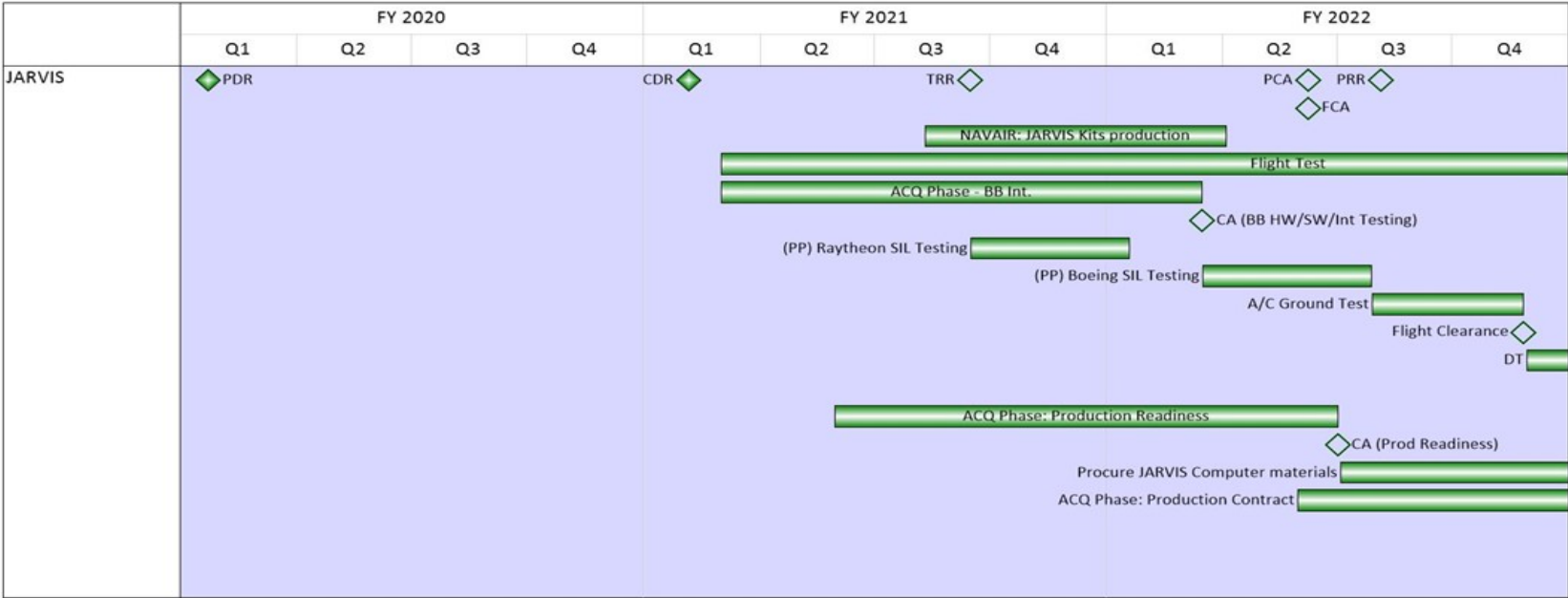
**Infrared Suppressor Redesign**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22

**Open Systems Architecture / Cyber Security**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22

**HMD Degraded Visual Environment Development**

	FY 2020				FY 2021				FY 2022				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
HMD Degraded Visual Environment					◆ RFP					◆ CA	◆ SRR	◆ PDR	◆ CDR

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>V-22 Hardware Development</b>				
Test & Evaluation: Development Test: Development Flight Test / Integrated Test (IT-IIIID)	1	2020	4	2022
Test & Evaluation: Development Test: Rig Test	1	2020	4	2021
Test & Evaluation: Development Test: Baseline Testing	1	2021	4	2021
Test & Evaluation: Operational Evaluation: Operational Testing	1	2020	4	2022
<b>V-22 CMV Development</b>				
Reviews: Reviews: Initial Operational Capability	4	2021	4	2021
Reviews: Reviews: Physical Configuration Audit	1	2020	1	2020
Test & Evaluation: Development Test: Developmental Test (DT)	2	2020	4	2022
Test & Evaluation: Operational Evaluation: Operational Test (OT)	2	2021	4	2021
Production Milestones: Contract Awards: Lot 24 APN MV22 CMV	1	2020	1	2020
Production Milestones: Contract Awards: Lot 25 APN MV22 CMV	1	2021	1	2021
Production Milestones: Contract Awards: Lot 26 APN MV22 CMV	1	2022	1	2022
Production Milestones: Production Deliveries: Lot 22 APN CMV	1	2020	4	2020
Production Milestones: Production Deliveries: Lot 23 APN CMV	1	2021	4	2021
Production Milestones: Production Deliveries: Lot 24 APN CMV	1	2022	4	2022
<b>V-22 Electrical System Re-design</b>				
Reviews: Collins Aerospace: Collins Preliminary Design Review	3	2020	3	2020
Reviews: Collins Aerospace: Collins Critical Design Review	4	2020	4	2020
Reviews: Collins Aerospace: Test Readiness Review	3	2022	3	2022
Test & Evaluation: Collins Aerospace: Collins Aircraft Testing	4	2022	4	2022
Test & Evaluation: Bell Boeing: Lab Testing	1	2021	3	2021

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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 1425 / V-22
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Test & Evaluation: Bell Boeing: Aircraft Testing	3	2021	4	2022
<b><i>V-22 Infrared Suppressor (IRS) Re-design</i></b>				
Reviews: Systems Requirements Review	1	2020	1	2020
Reviews: Preliminary Design Review / Critical Design Review	3	2021	3	2021
Reviews: Test Readiness Review	3	2022	3	2022
Reviews: System Verification Review	3	2022	3	2022
Test & Evaluation: Flight Test	3	2022	3	2022
<b><i>V-22 Open System Architecture / Cyber Security</i></b>				
Reviews: Preliminary Design Review	1	2020	1	2020
Reviews: Critical Design Review	1	2021	1	2021
Reviews: Test Readiness Review	3	2021	3	2021
Reviews: Functional Configuration Audit	2	2022	2	2022
Reviews: Production Readiness Review	3	2022	3	2022
Reviews: Physical Configuration Audit	2	2022	2	2022
Test & Evaluation: Qualification Lab Testing - #1	3	2021	1	2022
Test & Evaluation: Qualification Lab Testing - #2	1	2022	3	2022
Test & Evaluation: Grount Test	3	2022	4	2022
Test & Evaluation: Developmental Test	4	2022	4	2022
Test & Evaluation: Flight Test	1	2021	4	2022
<b><i>V-22 Degraded Visual Environment / Helmet Mounted Display Development</i></b>				
Reviews: Systems Requirements Review	4	2021	4	2021
Reviews: Preliminary Design Review	1	2022	1	2022
Reviews: Critical Design Review	3	2022	3	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy										<b>Date:</b> May 2021		
<b>Appropriation/Budget Activity</b> 1319 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A				<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
3090: V-22 Improvement Program	0.000	0.000	13.952	21.431	-	21.431	-	-	-	-	-	-
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 (V/STOL), 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 2021 FCS re-design contract award has been delayed due to the change in the Request for Proposal for a Fixed Price Incentive Fee contract versus Cost Plus Incentive Fee causing delays in the technical evaluation and negotiations.

FY 2022 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, engineering, logistics, flight test, flight test support and address the correction of deficiencies and obsolescence.

FY 2022 continues FCS re-design, which will address obsolescence issues, mitigate deficiencies and provide improved capabilities through hardware and software upgrades.

FY 2022 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 hardware and software technologies to mitigate future obsolescence.

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

	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<b>Title:</b> V-22 Airframe Hardware Development	0.000	0.000	6.049	0.000	6.049
<b>Articles:</b>	-	-	-	-	-
<b>Description:</b> 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					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<p>Maneuvering Envelope Expansion, and Safety Improvement efforts. Continues engineering, logistics, flight test, flight test support, and addresses the correction of deficiencies and obsolescence.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2022 Base Plans:</b> 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.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase in FY 2022 for Hardware Development supports the Pitch Change Link re-design effort previously funded under PU 1425</p>					
<p><b>Title:</b> V-22 Flight Control System (FCS) Re-Design</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> 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.</p> <p><b>FY 2021 Plans:</b> Continue development efforts started under the Hardware Development line. Continue hardware and software architecture upgrades to mitigate obsolescence and throughput constraints such as Flight Control Computer, Cockpit Interface Unit, and Flight Test Interface Panel. Upgrade software language to the Cross Channel Data Link and Flight Control Computer Operational Flight Program.</p> <p><b>FY 2022 Base Plans:</b> 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</p>	0.000	13.952	8.863	0.000	8.863
	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
<p>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 Phase 1 Non-Recurring Engineering to include completion of the Systems Requirements Review and the Preliminary Design Review.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Decrease in FY 2022 for FCS re-design is due to the shift of funding for USMC higher priorities.</p>					
<p><b>Title:</b> V-22 Open Systems Architecture/Cyber Security</p> <p align="right"><b>Articles:</b></p> <p><b>Description:</b> 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/transfer. The project also includes risk reduction and development efforts such as Modular Avionics Architecture, Cyber Security Implementation, Cyber Safe Flight Control improvements, Cockpit Displays and Center Console re-design (CDU), Keyboard Unit, Engine Instrument Crew Alerting System, and Remote Frequency Indicator Selector re-design Mission Computer Obsolescence mitigation, functional upgrades, Ethernet backbone (High speed Ethernet communication) and 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.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2022 Base Plans:</b> 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 EICAS.</p> <p><b>FY 2022 OCO Plans:</b> N/A</p> <p><b>FY 2021 to FY 2022 Increase/Decrease Statement:</b></p>	0.000	0.000	5.557	0.000	5.557
	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy		<b>Date:</b> May 2021
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>
Increase in FY 2022 for Open Systems Architecture/Cyber Security supports the EICAS re-design effort previously funded under PU 1425.					
<b>Title:</b> V-22 Development Support, Test, and Evaluation	0.000	0.000	0.962	0.000	0.962
<b>Articles:</b>	-	-	-	-	-
<b>Description:</b> 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.					
<b>FY 2021 Plans:</b> N/A					
<b>FY 2022 Base Plans:</b> 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.					
<b>FY 2022 OCO Plans:</b> N/A					
<b>FY 2021 to FY 2022 Increase/Decrease Statement:</b> Increase in FY 2022 for Development Support, Test, and Evaluation supports the additional developmental requirements for Pitch Change Link Bearing re-design and EICAS.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	13.952	21.431	0.000	21.431

<b>C. Other Program Funding Summary (\$ in Millions)</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022 Base</b>	<b>FY 2022 OCO</b>	<b>FY 2022 Total</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APN 0164: V-22	1,111.314	1,263.315	791.263	-	791.263	-	-	-	-	-	-
• APN 0590: V-22 Series	325.278	320.989	312.835	-	312.835	-	-	-	-	-	-
• APN 0605/J0164: V-22 Initial Spares	4.247	3.328	25.627	-	25.627	-	-	-	-	-	-
• RDTE 1160403BB: CV-22 Special Operations, Aviation Systems	23.931	13.623	6.932	-	6.932	-	-	-	-	-	-
• RDTE BA07 0401318F: CV-22 USAF BA07	17.355	18.385	17.270	-	17.270	-	-	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2022 Navy	<b>Date:</b> May 2021
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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**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.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program
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<b>Product Development (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
V-22 Airframe Hardware Development	Various	Various : Various	0.000	0.000		0.000		6.049	Jan 2022	-		6.049	-	-	-
V-22 Flight Control System Re-Design	SS/BOA	Bell Boeing : Ridley Park, PA	0.000	0.000		13.009	Aug 2021	8.863	Jun 2022	-		8.863	-	-	-
V-22 Open Systems Architecture/Cyber Security	Various	Various : Various	0.000	0.000		0.000		5.557	Mar 2022	-		5.557	-	-	-
<b>Subtotal</b>			0.000	0.000		13.009		20.469		-		20.469	-	-	N/A

**Remarks**  
 Hardware Development: Increase supports the Pitch Change Link re-design effort previously funded under PU 1425.  
 Flight Control System: FY 2021 Contract Award delayed due to late and incomplete proposal. FY 2022 decrease is due to the shift of funding for USMC higher priorities.  
 Open Systems Architecture/Cyber Security: Increase supports the Engine Instrument Crew Alerting System re-design effort previously funded under PU 1425.

<b>Support (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
V-22 Gov't Engineering Support	WR	NAWCAD : Pax River, MD	0.000	0.000		0.682	Nov 2020	0.696	Nov 2021	-		0.696	-	-	-
<b>Subtotal</b>			0.000	0.000		0.682		0.696		-		0.696	-	-	N/A

**Remarks**  
 Government Engineering Support: Increase is due to inflation.

<b>Management Services (\$ in Millions)</b>				<b>FY 2020</b>		<b>FY 2021</b>		<b>FY 2022 Base</b>		<b>FY 2022 OCO</b>		<b>FY 2022 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
V-22 Program Mgmt Support	WR	NAWCAD : Pax River, MD	0.000	0.000		0.251	Nov 2020	0.256	Nov 2021	-		0.256	-	-	-
V-22 Travel	WR	Various : Various	0.000	0.000		0.010	Sep 2021	0.010	Sep 2022	-		0.010	-	-	-
<b>Subtotal</b>			0.000	0.000		0.261		0.266		-		0.266	-	-	N/A



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**Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program
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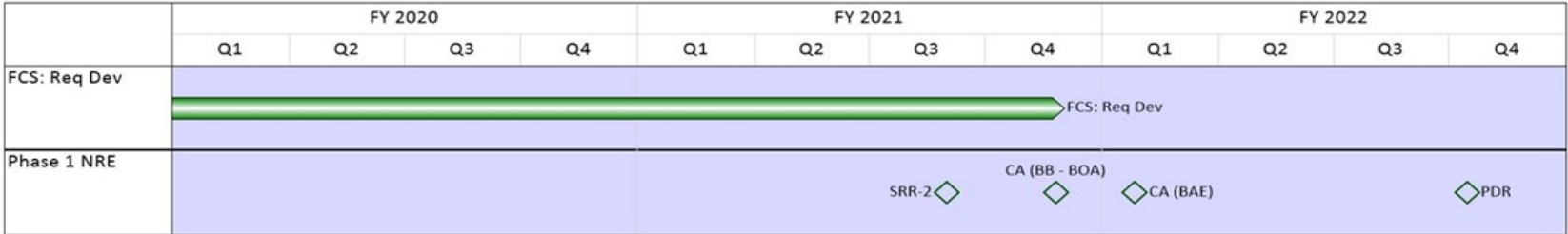
**Hardware Development**

	FY 2020				FY 2021				FY 2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Pitch Change Link	Flight Test / Integrated Development Testing											
	Operational Testing											

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program

**Flight Control System Redesign**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program

**Open Systems Architecture / Cyber Security**



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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 3090 / V-22 Improvement Program
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Hardware Development</i></b>				
Test & Evaluation: Development Test	1	2020	4	2022
Test & Evaluation: Operational Evaluation	1	2020	4	2022
<b><i>Flight Control System Re-Design</i></b>				
Reviews: System Requirements Review	3	2021	3	2021
Reviews: Preliminary Design Review	4	2022	4	2022
<b><i>Open Systems Architecture / Cyber Security</i></b>				
Reviews: Systems Requirements Review	4	2021	4	2021
Reviews: Preliminary Design Review	3	2022	3	2022
Production Milestones: Contract Award	3	2021	3	2021

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**Exhibit R-2A, RDT&E Project Justification:** PB 2022 Navy **Date:** May 2021

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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
9999: <i>Congressional Adds</i>	0.000	12.888	0.000	0.000	-	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**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 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 (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 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 a Urgent Universal Needs Statement.

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

	FY 2020	FY 2021
<b>Congressional Add:</b> Common Lightweight Cargo System <i>FY 2020 Accomplishments:</i> N/A <i>FY 2021 Plans:</i> N/A	8.061	0.000
<b>Congressional Add:</b> Active vibration control system <i>FY 2020 Accomplishments:</i> N/A <i>FY 2021 Plans:</i> N/A	4.827	0.000
<b>Congressional Adds Subtotals</b>	12.888	0.000

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

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy Date: May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 9999 / Congressional Adds
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**C. Other Program Funding Summary (\$ in Millions)**

**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 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 in support of the COD mission, (4) an improved cargo handling system, and (5) enhanced fuel jettison system.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2022 Navy</b>		<b>Date: May 2021</b>
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 9999 / Congressional Adds

**Common Lightweight Cargo System**

	FY 2020				FY 2021				FY 2022				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
COOLS			Contract Award ◇	SRR ◇			PDR ◇	CDR ◇	DT/OT ◇	Kits/Deliveries			



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**Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy** **Date:** May 2021

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604262N / V-22A	<b>Project (Number/Name)</b> 9999 / Congressional Adds
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Common Lightweight Cargo System</i></b>				
Reviews: System Requirements Review	4	2020	4	2020
Reviews: Preliminary Design Review	3	2021	3	2021
Reviews: Critical Design Review	4	2021	4	2021
Test & Evaluation: Developmental Test / Operational Test	1	2022	1	2022
Production Milestones: Kits / Deliveries	2	2022	4	2022
<b><i>Active Vibration Control System</i></b>				
Reviews: System Requirements Review	3	2022	3	2022