Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy												Date: February 2018
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 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	9,202.125	149.113	171.386	143.079	-	143.079	132.805	91.521	115.051	117.392	184.398	10,306.870
1425: *V-22*	9,202.125	149.113	171.386	143.079	-	143.079	132.805	91.521	115.051	117.392	184.398	10,306.870
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 is replacing the CH-46E and CH53A/D in the Marine Corps and the CMV-22 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 A and 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. 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 or an Urgent Universal Needs Statement. Development efforts include Mission System Upgrade, Electrical System Upgrades, Engine Air Particle Separator (EAPS), Mid-Wing Process Unit, ARC 210 Series Radio, Mission Computer Obsolescence Initiative, Weapon Systems Development, Time on Wing, Digital Interoperability (DI), Blue Force Tracker/Netted Weather, Technology Insertion efforts such as: Swashplate Actuator, Infrared Suppressor, Modular Avionics Mission Computer Re-design, Center Console Re-design, Helmet Mounted Display and Multi-Spectral Sensor, Aircraft Mission Maneuvering Envelope Expansion and testing of Additive Manufacturing processes for selected MV-22 components.

The MV-22 Hardware Development Airframe continues to fund development efforts in support of MV-22 Block upgrades, Time on Wing and Safety Improvement efforts such as Cockpit Engine Health Indicator and gearbox vibration monitoring. Continue engineering, logistics, flight test, flight test support and address the correction of deficiencies and obsolescence. Continue MV-22 software development/mission computer obsolescence initiatives such as transition tech demo and modular avionics mission computer redesign. Continue V-22 integrated aircraft survivability equipment to include correcting deficiencies; radar warning system, integration with an upgraded missile warning and active infrared countermeasure system, and providing integrated threat warning information on the aircraft's main flight displays. Continue correcting deficiencies of the current EAPS and development of particle separation solutions. Continue Nacelle redesign efforts that will improve maintainability and reliability, as well as wiring redesign.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy	Date: February 2018
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*

MV-22 Hardware Development Propulsion will continue to fund the flight/engine hours necessary for developmental testing at the Patuxent River squadron. Rolls-Royce will continue to provide engine support and development of MV-22 flight testing.

FY19 continues DI, United States Marine Corps Aviation wide implementation of 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.

FY19 continues the CMV-22 Hardware Development efforts which consist of an Engineering Change Proposal (ECP) to modify 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 radio to transmit/receive beyond line of sight over water and (3) a public address system for use while transporting passengers. CMV will begin to support development efforts such as: Correcting deficiencies of the current swashplate actuator, EAPS, Electrical System Re-design, IRS Re-design, Center Console Re-design and Modular Avionics / Cyber Security Implementation.

FY19 continues the V-22 Aerial Refueling System (VARS) capability. VARS will provide V-22 tanker capability to the Marine Air Ground Task Force, enabling safe and efficient execution of all missions, tactical or humanitarian. The system will allow the V-22 to provide fuel to other Air Combat Element aircraft, such as F-35B, F-18, V-22 and CH-53E/K, while en-route, in the objective area, or during recovery, extending the operational reach/duration. With the V-22 deployed onboard, amphibious assault ships would gain an organic aerial refueling capability, maximizing response time and agility.

FY19 continues Electrical System re-design and reliability improvement efforts. This effort will assess and select engineering solutions to improve the Generator and Generator Control Unit components. Increased 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.

FY19 continues Infrared Suppressor (IRS) Re-design efforts. The IRS system masks the infrared signature of an aircraft, which increases the survivability. The current system does not meet reliability requirements and is a high readiness degrader for the V-22 fleet. This effort funds the Engineering & Manufacturing Development, as well as the instrumented flight test of a more reliable V-22 IRS upgrade.

FY19 continues V-22 Technology Insertion development efforts. These efforts provide new capabilities focused on enhancing survivability; software and hardware modularity and maturation of aircraft interfaces to support Cyber-Resilient interoperability. Also includes risk reduction and development efforts such as Modular Avionics/Cyber Security Implementation, Cyber / Safe Flight Controls improvements, Enhanced Defensive Weapons Capabilities, Radio Frequency Threat Protection and Airborne Networking.

FY19 continues V-22 Multi-Spectral Sensor / Helmet Mounted Display risk reduction and developmental efforts, started in the Technology Insertion line, for an improved Navigation Sensor (including added capabilities such as targeting designating and Degraded Visual Environment improvements) and a Helmet Mounted Display.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy	Date: February 2018
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*

FY19 continues the V-22 Time on Wing effort, started in the Technology Insertion line, to redesign and correct the deficiencies on the current swashplate actuator to provide a fully qualified fatigue life component.

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.

Note: 1st 2 CMV production aircraft are test aircraft. They will be delivered to Patuxent River to support DT testing.
OT will be conducted as part of a carrier air wing work-up prior to deployment. OT testing will focus on assessing the effectiveness and suitability of the CMV-22 as the Carrier Onboard Delivery (COD) platform in the carrier strike group.
There is no Milestone C, because CMV-22 is being executed as an ECP to V-22 Block C. IOC for CMV-22 is FY-21.

Note: Cost to complete should be 194.589, and Total Cost should be 10,317.061. Both are correct on the R-3.

Note: The FY 2019 funding request was reduced by $2.268 million to account for the availability of prior year execution balances.

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	189.423	171.386	137.814	-	137.814
Current President's Budget	149.113	171.386	143.079	-	143.079
Total Adjustments	-40.310	0.000	5.265	-	5.265
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-5.127	0.000			
• Program Adjustments	-15.000	0.000	6.863	-	6.863
• Rate/Misc Adjustments	0.000	0.000	-1.598	-	-1.598
• Congressional General Reductions Adjustments	-0.005	-	-	-	-
• Congressional Directed Reductions Adjustments	-20.178	-	-	-	-

Change Summary Explanation

1. CMV EDM Article Test was deleted as requirement is no longer needed. CMV schedule has been updated to include the Test Articles which are the first two aircraft off of the production line in FY20.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy	Date: February 2018
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604262N *I V-22A*

2. IRS - flight demo extended through 2Q18 due to aircraft availability. EMD contract award moved to 3Q19 to align with flight demo. IRS schedule updated to reflect NRE in lieu of DT/OT to reflect work being done on the EMD contract. It was mislabeled as DT/OT.
4. VARS IOC added 3Q19 as it was missing on the schedule. VARS DT/OT has been combined to reduce testing time and provide efficiency.
6. Tech Insertion BIC contract awards were deleted as effort is no longer being funded.

Technical: Not applicable

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy											Date: February 2018	
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 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
1425: *V-22*	9,202.125	149.113	171.386	143.079	-	143.079	132.805	91.521	115.051	117.392	184.398	10,306.870
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 and CH53A/D 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 for correction of deficiencies and includes Block A and 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. 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 or a Urgent Universal Needs Statement. Development efforts include Mission System Upgrade, Electrical System Upgrades, Engine Air Particle Separator (EAPS), Mid-Wing Process Unit, ARC 210 Series Radio, Mission Computer Obsolescence Initiative, Weapon Systems Development, Time on Wing, Digital Interoperability (DI), Blue Force Tracker/Netted Weather, Technology Insertion such as: Swashplate Actuator, Infrared Suppressor, Modular Avionics Mission Computer Re-design, Center Console Re-design, Helmet Mounted Display and Multi-Spectral Sensor, Aircraft Mission Maneuvering Envelope Expansion and testing of Additive Manufacturing processes for selected MV-22 components.

The MV-22 Hardware Development Airframe continues to fund development efforts in support of MV-22 Block upgrades, Time on Wing and Safety Improvement efforts such as Cockpit Engine Health Indicator and gearbox vibration monitoring. Continue engineering, logistics, flight test, flight test support and address the correction of deficiencies and obsolescence. Continue MV-22 software development/mission computer obsolescence initiatives such as transition tech demo and modular avionics mission computer redesign. Continue V-22 integrated aircraft survivability equipment to include correcting deficiencies; radar warning system, integration with an upgraded missile warning and active infrared countermeasure system, and providing integrated threat warning information on the aircrafts main flight displays. Continue correcting deficiencies of the current EAPS and development of particle separation solutions. Continue Nacelle redesign efforts that will improve maintainability and reliability, as well as wiring redesign.

MV-22 Hardware Development Propulsion will continue to fund the flight/engine hours necessary for developmental testing at the Patuxent River squadron. Rolls-Royce will continue to provide engine support and development of MV-22 flight testing.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

FY19 continues V-22 DI, United States Marine Corps Aviation wide implementation of 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.

FY19 continues the CMV-22 Hardware Development efforts which consist of an Engineering Change Proposal (ECP) to modify MV-22 into the CMV configuration to perform the Carrier Onboard Delivery (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 radio to transmit/receive beyond line of sight over water and (3) a public address system for use while transporting passengers. CMV will begin to support development efforts such as: Correcting deficiencies of the current swashplate actuator, EAPS, Electrical System Re-design, IRS Re-design, Center Console Re-design and Modular Avionics / Cyber Security Implementation.

FY19 continues the V-22 Aerial Refueling System (VARS) capability. VARS will provide V-22 tanker capability to the Marine Air Ground Task Force, enabling safe and efficient execution of all missions, tactical or humanitarian. The system will allow the V-22 to provide fuel to other Air Combat Element aircraft, such as F-35B, F-18, V-22 and CH-53E/K, while en-route, in the objective area, or during recovery, extending the operational reach/duration. With the V-22 deployed onboard, amphibious assault ships would gain an organic aerial refueling capability, maximizing response time and agility.

FY19 continues Electrical System re-design and reliability improvement efforts. This effort will assess and select engineering solutions to improve the Generator and Generator Control Unit components. Increased 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.

FY19 continues Infrared Suppressor (IRS) Re-design efforts. The IRS system masks the infrared signature of an aircraft, which increases the survivability. The current system does not meet reliability requirements and is a high readiness degrader for the V-22 fleet. This effort funds the Engineering & Manufacturing Development, as well as the instrumented flight test of a more reliable V-22 IRS upgrade.

FY19 continues V-22 Technology Insertion development efforts. These efforts provide new capabilities focused on enhancing survivability; software and hardware modularity and maturation of aircraft interfaces to support Cyber-Resilient interoperability. Also includes risk reduction and development efforts such as Modular Avionics/Cyber Security Implementation, Cyber/Safe Flight Controls improvements, Enhanced Defensive Weapons Capabilities, Radio Frequency Threat Protection and Airborne Networking.

FY19 continues V-22 Multi-Spectral Sensor / Helmet Mounted Display risk reduction and developmental efforts, started in the Technology Insertion line, for an improved Navigation Sensor (including added capabilities such as targeting designating and Degraded Visual Environment improvements) and a Helmet Mounted Display.

FY19 continues the V-22 Time on Wing effort, started in the Technology Insertion line, to redesign and correct the deficiencies on the current swashplate actuator to provide a fully qualified fatigue life component.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: MV-22 Hardware Development Airframe	16.636	16.827	15.145	0.000	15.145
Articles:	-	-	-	-	-

Description: The MV-22 Hardware Development Airframe continues to fund development efforts. Continue development in support of MV-22 Block upgrades, electrical system capacity efforts, Time on Wing/Reliability Improvements efforts such as testing of Additive Manufacturing processes for selected MV-22 components and Safety Improvement efforts such as Cockpit Engine Health Indicator (CEHI) and gearbox vibration monitoring. Continue engineering, logistics, flight test, flight test support and address the correction of deficiencies and obsolescence. Continue MV-22 software development/sustainment efforts such as transition tech demo and Modular Avionics Mission Computer Obsolescence Initiative re-design. Continue V-22 integrated aircraft survivability equipment to include correcting deficiencies; radar warning system, integration with an upgraded missile warning and active infrared countermeasure system, cockpit interface units, electrical power system, and providing integrated threat warning information on the aircraft main flight displays. Continue correcting deficiencies of the current EAP's and development of particle separation solutions. Continue Nacelle redesign efforts that will improve maintainability and reliability, as well as wiring redesign.

FY 2018 Plans:
Continue MV-22 development efforts. Continue MV-22 software development/sustainment efforts such as Mission Computer Obsolescence Initiative re-design. Continue development in support of MV-22 Block upgrades and Time on Wing/Reliability Improvement efforts such as Improved Inlet Solution. Continue engineering, logistics, flight test, flight test support and address correction of deficiencies and obsolescence efforts such as Swashplate Actuator, Engine Air Particle Separator, also including training upgrades and developments. Continue reliability improvement efforts such as Additive manufacturing, and Miniaturized Airborne Global Positioning as well as Re-design efforts to correct critical Reliability, Maintainability and Availability issues in support of readiness Operational Safety Improvement Program.

FY 2019 Base Plans:
Continue MV-22 development efforts. Continue MV-22 software development/sustainment efforts. Continue development in support of MV-22 Block upgrades, Time on Wing/Reliability Improvements such as testing of Additive Manufacturing processes for selected MV-22 components and Safety Improvement efforts such as CEHI and gearbox vibration monitoring. Continue engineering, logistics, flight test, flight test support and address correction of deficiencies and obsolescence efforts such as Engine Air Particle Separator, also including training upgrades and developments. Continue reliability improvement efforts as well as Re-design efforts to

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
correct critical Reliability, Maintainability and Availability issues in support of readiness Operational Safety Improvement Program. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $1.682M from FY-18 to FY-19 for Hardware Development is due to design changes to the Improved Inlet Solution (IIS) program.					
Title: MV-22 Hardware Development Propulsion/Mission Care ***Articles:*** ***Description:*** The funding of Mission Care relates to our RDT&E program as it funds the flight/engine hours necessary for developmental testing at the Patuxent River squadron. In addition, it pays for Rolls Royce engine support at Patuxent River. ***FY 2018 Plans:*** Funds continued for Mission Care flight & engine hours for developmental testing at Patuxent River squadron. ***FY 2019 Base Plans:*** Funds continues for Mission Care flight & engine hours for developmental testing at Patuxent River squadron. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $1.545M from FY-18 to FY-19 for Hardware Development Propulsion / Mission Care is due to increased Developmental Testing for particle separation and engine hardware and software improvements.	0.162 -	0.167 -	1.712 -	0.000 -	1.712 -
Title: MV-22 Digital Interoperability ***Articles:*** ***Description:*** Digital Interoperability (DI) is the United States Marine Corps Aviation wide implementation of iridium and software defined radios, such as Software Reprogrammable Payload (SRP), 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	9.900 -	12.200 -	22.839 -	0.000 -	22.839 -

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Radio Frequency Identification technology, advanced Electronic Warfare/Cyber capability, and threat data capturing/off-boarding. ***FY 2018 Plans:*** Funds continued for the maturation of Digital Interoperability and assessment of effectiveness via gateway messaging, data flow, data assurance, and quality of service to support the Information Exchange Requirements to support the approved integrated aviation survivability equipment information systems Initial Capability Document, distributed electronic warfare operations, data fusion, off-boarding, and mission thread Information exchange Requirements across the range of military operations. ***FY 2019 Base Plans:*** Funds continues for the maturation of Marine Air Ground Task Force (MAGTF) Agile Network Gateway Link (MANGL). This includes Digital Interoperability and assessment of effectiveness via gateway messaging, data flow, data assurance, and quality of service to support the Information Exchange Requirements to support the approved integrated aviation survivability equipment information systems Initial Capability Document, distributed electronic warfare operations, data fusion, and mission thread Information exchange Requirements across the range of military operations. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $10.639M from FY-18 to FY-19 for Digital Interoperability is due to the Software Reprogrammable Payload being combined with the Digital Interoperability effort in FY-19, and increase in Developmental Testing requirements.					
Title: MV-22 Software Reprogrammable Payload (SRP) ***Articles:*** ***Description:*** SRP is a single common payload module that is open architecture, government owned, flexible, and reconfigurable to support simultaneous missions and applications making maximum use of available bandwidth and ensuring interoperability. Provides a bridge and translator to allow various systems/waveforms to collaborate and provides the V-22 operator and passenger with a common operating picture. ***FY 2018 Plans:*** Funding continued for SRP gateway development to provide for Digital Interoperability via Sensor Fusion and Integrated Aircraft Survivability Equipment. Continuation of waveform development of Spiral II waveforms (Link	6.000 -	6.000 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
16, Bandwidth Efficient Common Data Link, Tactical Targeting Network Technology and associated hardware into the SRP radio. ***FY 2019 Base Plans:*** N/A ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $6.0M from FY-18 to FY-19 for Software Reprogrammable Payload (SRP) is due to the combining of the SRP line into the Digital Interoperability line beginning in FY-19.					
Title: V-22 CMV Development	59.636	65.185	23.634	0.000	23.634
Articles:	1	-	-	-	-
Description: Funding supports the implementation of an Engineering Change Proposal (ECP) to incorporate the new systems required for the CMV configuration to perform the Carrier Onboard Delivery (COD) mission. The ECP will add (1) the capability to meet the range requirements that the COD mission demands (2) a High Frequency radio to transmit/receive beyond line of sight over water and (3) a Public Address system for use while transporting passengers. Continue CMV-22 integrated aircraft survivability equipment to include correcting deficiencies of the current swashplate actuator, EAPS, radar warning system, integration with an upgraded missile warning and active infrared countermeasure system, and providing integrated threat warning information on the aircrafts main flight displays. ***FY 2018 Plans:*** Continued funding for the V-22 CMV Development effort to perform the COD mission. Support the development of Functional Test Plans and qualification efforts for the High Frequency radio to transmit/receive beyond line of sight over water and the Public Address system for use while transporting passengers. Development of the Joint Vertical Experimental Application System Software will continue. Begin tooling design and fabrication for the enlarged sponsons and wing tanks and the completion of the live fire test sponson fabrication will occur. Begin risk reduction flight testing and develop the logistics products. Begin the test Instrumentation design and planning for the CMV aircraft. ***FY 2019 Base Plans:*** Continues funding for the V-22 CMV Development effort to perform the COD mission. Support the development of Functional Test Plans for the High Frequency (HF) radio to transmit/receive beyond line of sight over water					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
and the Public Address (PA) system. Development of the Joint Vertical Experimental Application System Software (JASS) will continue. Continue Modular Avionics software development / sustainment efforts such as Mission Computer obsolescence initiative redesign and modular software. Continue developmental efforts such as swashplate actuator, electrical system re-design, EAPS, IRS re-design and Cyber Security implementation. Begin the test instrumentation design and planning for the CMV aircraft. Begin Carrier Suitability and Integration testing and will complete developmental test risk reduction activities on PA system and HF radio and begin Alternate Live Fire Test and Evaluation development activities. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $41.551M from FY-18 to FY-19 for CMV Development is in accordance with planned program execution. Development efforts decrease as program moves into Production phase.					
Title: V-22 Aerial Refueling System Development	16.501	17.323	10.615	0.000	10.615
Articles:	-	-	-	-	-
Description: V-22 Aerial Refueling System (VARS) will provide V-22 tanker capability to the Marine Air Ground Task Force, enabling safe and efficient execution of all missions, tactical or humanitarian. The system will allow the V-22 to provide fuel to other Air Combat Element aircraft, such as F-35B, F-18, V-22 and CH-53E/K, while en-route, in the objective area, or during recovery, extending the operational reach/duration. With the V-22 deployed onboard, amphibious assault ships would gain an organic aerial refueling capability, maximizing response time and agility. ***FY 2018 Plans:*** Continued funding for the VARS Development Capability. VARS will provide V-22 tanker capability to the Marine Air Ground Task Force, enabling safe and efficient execution of all missions, tactical or humanitarian. The FY18 funding will be used to continue flight testing and supply engineering support for any issues identified during flight test as well as the procurement of additional flight test kits. ***FY 2019 Base Plans:*** Continues funding for the VARS Development Capability. VARS will provide V-22 tanker capability to the Marine Air Ground Task Force, enabling safe and efficient execution of all missions, tactical or humanitarian. The FY19					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
funding will be used to supply engineering support for any issues identified during flight test and initial fleet deployment as well as continued support equipment development and delivery. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $6.708M from FY-18 to FY-19 for V-22 Aerial Refueling System Development is in accordance with planned program execution.					
Title: MV-22 Electrical System Re-design	5.200	8.200	6.964	0.000	6.964
Articles:	-	-	-	-	-
Description: Continue Electrical System re-design and reliability improvement efforts. This effort will assess and select engineering solutions to improve the Generator and Generator Control Unit (GCU) components as well as support relocation of the GCU. Upgrading the increased 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. Nacelle redesign will accommodate Inlet Solution wiring and remote Variable Frequency Generator and Generator Control Unit (VFG/GCU) provisions. Will accommodate Inlet Solution Wiring and remote Variable Frequency Generator (VFG), Constant Frequency Generator (CFG) and Generator Control Unit (GCU) provisions. ***FY 2018 Plans:*** Continued Electrical System re-design and reliability improvement effort started in the hardware development line. This effort is a two phase approach; first phase will redesign and separate the GCUs (both VFG and CFG) from the generators and relocate them to a more benign environment (such as the fuselage); second phase will redesign VFG/GCU to one common configuration increasing power generation capacity required to accommodate demands on electrical power system as additional systems are added to the V-22. Continue Nacelle redesign efforts that will improve maintainability and reliability, as well as wiring redesign. ***FY 2019 Base Plans:*** Continues Electrical System re-design and reliability improvement efforts noting the revised Acquisition strategy that will redesign and replace only the CFG GCU without relocating the GCU. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Decrease of $1.236M from FY-18 to FY-19 reflects the revised FY-19 program plan to redesign and replace the CFG GCU versus relocating it.					
Title: V-22 Infrared Suppressor (IRS) Re-design	8.694	10.578	8.162	0.000	8.162
Articles:	-	-	-	-	-
Description: Funding supports the development of a new or improved Infrared Suppressor (IRS) system for the V-22. The IRS system masks the infrared signature of an aircraft which increases the survivability. The current system does not meet reliability requirements and is a high readiness degrader for the V-22 fleet. This funding will provide for Engineering & Manufacturing Development and instrumented flight test of a more reliable V-22 IRS upgrade. ***FY 2018 Plans:*** Funding continued for the development of a new IRS system for the V-22. The IRS system masks the infrared signature of an aircraft which increases the survivability. FY18 funding will provide for continued Engineering & Manufacturing Development of upgraded IRS system. ***FY 2019 Base Plans:*** Funding continues for the development of a new IRS system for the V-22. The IRS system masks the infrared signature of an aircraft which increases the survivability. FY19 funding will provide for continued Engineering & Manufacturing Development of an upgraded IRS system. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $2.416M from FY-18 to FY-19 is in accordance with planned program execution, and is due to completion of a Down Select Analysis of Alternatives to a Single Solution contract award.					
Title: MV-22 Technology Insertion	5.641	11.072	7.575	0.000	7.575
Articles:	-	-	-	-	-
Description: The V-22 Technology Insertion development effort will provide new capabilities focused on enhancing survivability; software and hardware modularity and maturation of aircraft interfaces to support interoperability. Tech Insertion includes risk reduction and development efforts such as Modular Avionics/Cyber Security Implementation, Enhanced Defensive Weapons Capabilities, Radio Frequency Threat Protection, and Airborne Networking.					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
FY 2018 Plans: FY18 Technology Insertion funding provided for efforts to include risk reduction and development efforts such as Multi-Spectral Sensor Integration, including Improved Forward Looking Infrared, Degraded Visual Environment Mitigation, Electronic Warfare, Helmet Mounted Display, Modular Avionics/Cyber Security Implementation, Enhanced Defensive Weapons Capabilities, Improved Survivability (Radio Frequency Threat Protection) and Airborne Networking. ***FY 2019 Base Plans:*** FY19 continues V-22 Technology Insertion development efforts at various vendors. This effort provides new capabilities focused on enhancing survivability; software and hardware modularity and maturation of aircraft interfaces to support Cyber-Resilient Interoperability. Also includes risk reduction and development efforts such as Modular Avionics / Cyber Security Implementation, Cyber / Safe Flight Controls Improvements, Enhanced Defensive Weapons Capabilities, Radio Frequency Threat Protection and Airborne Networking. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease of $3.497M from Technology Insertion is due to Multi-Spectral Sensor / Helmet Mounted Display and Swashplate Actuator being broken out separately in R-2a Accomplishments.					
Title: V-22 Development Support, Test and Evaluation	20.743	23.834	25.995	0.000	25.995
Articles:	-	-	-	-	-
Description: Fund Government Engineering, 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, as well as fund Tactical Training Theatre Assessment and Planning Phase III program to ensure that all Navy training and testing at sea is compliant with the major Federal environmental laws. ***FY 2018 Plans:*** Funds provided for continued support of FOT&E, DT&E and OT&E to include flight control software, vehicle system operating software, inlet distortion, APR-39D(V)2, structural fatigue, envelope expansion, software airframe loads,					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
nacelle sails, integrated aircraft survivability equipment, Nacelle Sail testing, traffic collision avoidance system, bonded tabs, aerial refueling system and refueling envelope, Tactical Training Theatre Assessment and Planning Phase III and CMV risk reduction. ***FY 2019 Base Plans:*** Funds provided for continues support of FOT&E, DT&E and OT&E to include flight control software, vehicle system operating software, inlet distortion, APR-39D(V)2, structural fatigue, envelope expansion, software airframe loads, nacelle sails, integrated aircraft survivability equipment, Nacelle Sail testing, Traffic Collision Avoidance System, Bonded Tabs, Aerial Refueling System and Refueling Envelope, Tactical Training Theatre Assessment and Planning Phase III and CMV risk reduction. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $2.161M from FY-18 to FY-19 in Development Support, Test and Evaluation reflects developmental testing requirements for CMV Aircraft.					
Title: Multi-Spectral Sensor / Helm Mounted Display	0.000	0.000	10.591	0.000	10.591
Articles:	-	-	-	-	-
Description: The V-22 Multi-Spectral Sensor / Helmet Mounted Display will provide risk reduction and developmental efforts for an improved Navigation Sensor and a Helmet Mounted Display. ***FY 2018 Plans:*** N/A ***FY 2019 Base Plans:*** FY19 continues the V-22 Multi-Spectral Sensor/Helmet Mounted Display risk reduction and developmental efforts started in the Technology Insertion line for an improved Navigation Sensor (including added capabilities such as targeting designating and Degraded Visual Environment improvements) and a Helmet Mounted Display. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Increase of $10.591M from FY-18 to FY-19 for Multi-Spectral Sensor / Helmet Mounted Display due to the effort starting under the Technology Insertion line and continuing under an individual line. New schedule has been added					
Title: Swashplate Actuator redesign	0.000	0.000	9.847	0.000	9.847
Articles:	-	-	-	-	-
Description: The V-22 Time on Wing effort, started in the Technology Insertion line, will redesign and correct the deficiencies on the current swashplate actuator to provide a fully qualified fatigue life component. FY2018 began the engineering analysis and design. ***FY 2018 Plans:*** N/A ***FY 2019 Base Plans:*** FY19 funding continues the V-22 Time on Wing effort for to redesign and correct the deficiencies on the current swashplate actuator to provide a fully qualified fatigue life component. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase of $9.847M from FY-18 to FY-19 for Swashplate Actuator redesign is due to the effort starting under the Technology Insertion line and continuing under an individual line. New schedule has been added.					
Accomplishments/Planned Programs Subtotals	149.113	171.386	143.079	0.000	143.079

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• APN 0164: *V-22*	1,534.476	697.078	833.759	-	833.759	1,150.174	1,013.617	1,189.725	1,642.807	2,433.055	37,706.776
• APN 0590: *V-22 Series*	249.072	228.321	214.820	-	214.820	328.288	326.507	516.116	544.466	3,301.006	6,872.403
• APN 0605/J0164: *V-22 Inital Spares*	0.000	1.897	3.744	-	3.744	2.797	64.827	50.126	51.346	Continuing	Continuing
• RDTE 1160403BB: *CV-22 Special Operations, Aviation Systems*	15.590	14.259	21.635	-	21.635	28.462	8.500	8.000	18.000	0.000	117.439
• RDTE BA07 0401318F: *CV-22 USAF BA07*	28.702	22.519	16.641	-	16.641	14.731	14.985	15.293	0.000	41.970	219.360

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

The MV-22 is a post Milestone III ACAT-IC program. As a result of mishaps during and subsequent to MV-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 are to 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 Engineering Manufacturing and Development 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 Government will issue an RFP to the Contractor and upon award, an Integrated Baseline Review, Preliminary Design Review, Integrated Logistics Assessment and a Critical Design Review will be held to assess the design maturity of the CMV-22. The CMV-22 will add (1) the capability to meet the range requirements that the Carrier Onboard Delivery (COD) mission demands (2) a high frequency radio to transmit/receive beyond line of sight over water and (3) a public address system for use while transporting passengers in support of the COD mission.

E. Performance Metrics

Milestone Reviews.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MV-22 Hardware Dev Airframe	SS/CPIF	Various : Various	81.144	16.636	Jan 2017	16.827	Jan 2018	15.145	Jan 2019	-		15.145	129.474	259.226	259.226
MV-22 Hardware Dev Propulsion	SS/CPIF	Rolls-Royce Corp. : Indianapolis, IN	196.547	0.162	Nov 2016	0.167	Nov 2017	1.712	Nov 2018	-		1.712	2.125	200.713	200.713
V-22 Digital Interoperability	WR	Various : Various	11.138	9.900	Jan 2017	12.200	Jan 2018	22.839	Mar 2019	-		22.839	10.000	66.077	66.077
V-22 Software Reprogrammable Payload (SRP)	WR	NRL : China Lake, CA	5.200	6.000	Jan 2017	6.000	Jan 2018	0.000		-		0.000	0.000	17.200	17.200
CMV-22 Development	C/CPIF	Bell Boeing : Ridley Park, PA	16.084	59.636	Nov 2016	65.185	Nov 2017	23.634	Nov 2018	-		23.634	37.994	202.533	202.533
V-22 Aerial Refueling System Development	SS/CPIF	Bell Boeing : Ridley Park, PA	10.800	16.501	Jan 2017	17.323	Jan 2018	10.615	Dec 2018	-		10.615	15.210	70.449	70.449
V-22 Electrical System Re-Design	C/BA	Bell Boeing : Ridley Park, PA	0.000	5.200	Dec 2016	8.200	Dec 2017	6.964	Mar 2019	-		6.964	91.105	111.469	111.469
V-22 IRS Re-design	C/BA	Various : Various	0.960	8.694	Dec 2016	10.578	Jan 2018	8.162	Jan 2019	-		8.162	24.028	52.422	52.422
V-22 Tech Insertion	C/CPFF	Various : Various	2.658	5.641	Nov 2016	11.072	Mar 2018	7.575	Mar 2019	-		7.575	124.829	151.775	151.775
Multi-Spectral Sensor / Helmet Mounted Display	C/CPIF	Bell Boeing : Ridley Park, PA	0.000	0.000		0.000		10.591	Mar 2019	-		10.591	41.979	52.570	52.570
Swashplate Actuator	C/CPIF	Bell Boeing : Ridley Park, PA	0.000	0.000		0.000		9.847	May 2019	-		9.847	26.623	36.470	40.468
Prior year Prod Dev no longer funded in the FYDP	Various	Various : Various	5,106.472	0.000		0.000		0.000		-		0.000	0.000	5,106.472	-
		Subtotal	5,431.003	128.370		147.552		117.084		-		117.084	503.367	6,327.376	N/A

Remarks

Flight Testing begins for Digital interoperability FY18 to FY19 - Increase in Flight Testing requirements. CMV-22 received a Congressional Mark of $11.927M in FY17, therefore reducing FY17 from $71.563M to $59.636M. VARS received a Congressional Mark of $8.251M in FY17, therefore reducing FY17 from $24.752M to $16.501M. Electric System redesign of the Generators to one Common Configuration increasing power generation capacity increases cost in FY18. Technology Insertion Risk Reduction and Developmental efforts such as Multi-Spectral Sensor Integration, Helmet Mounted Display, Improved Survivability and Airborne Networking increases funding in FY18 to support an improved Navigation Sensor and Cyber Security

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy			Date: February 2018
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MV-22 Govt Engineering Sppt	WR	Various : Pax River, MD	1,109.492	2.829	Nov 2016	2.887	Nov 2017	2.750	Nov 2018	-		2.750	24.769	1,142.727	-
CMV-22 Govt Engineering Sppt	WR	Various : Pax River, MD	0.820	1.189	Nov 2016	1.298	Nov 2017	1.131	Nov 2018	-		1.131	3.527	7.965	-
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	1,300.030	4.018		4.185		3.881		-		3.881	28.296	1,340.410	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MV-22 Dev Test & Evaluation	WR	NAWCAD : Pax River, MD	1,041.383	13.455	Nov 2016	6.699	Nov 2017	6.940	Nov 2018	-		6.940	59.220	1,127.697	-
MV-22 Operational Test & Evaluation	WR	OT&E Force : Norfolk, VA	56.856	1.362	Dec 2016	1.476	Dec 2017	2.521	Dec 2018	-		2.521	23.006	85.221	-
CMV-22 Dev Test & Evaluation	WR	NAWCAD : Pax River, MD	0.000	0.000		9.100	Nov 2017	10.236	Nov 2018	-		10.236	10.280	29.616	-
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	1,146.439	14.817		17.275		19.697		-		19.697	92.506	1,290.734	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MV-22 Engineering Tech Sppt	Various	Various : Various	1,047.602	0.257	Nov 2016	0.259	Nov 2017	0.264	Dec 2018	-		0.264	6.350	1,054.732	-
MV-22 Management Sppt Svc	Various	Various : Various	157.551	0.674	Nov 2016	0.681	Nov 2017	0.695	Jan 2019	-		0.695	6.918	166.519	-
MV-22 Program Mgmt Support	WR	NAWCAD : Pax River, MD	61.676	0.795	Nov 2016	0.800	Nov 2017	0.816	Nov 2018	-		0.816	10.741	74.828	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy			Date: February 2018
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MV-22 Travel	WR	Various : Various	16.737	0.182	Jan 2017	0.185	Sep 2018	0.185	Sep 2019	-		0.185	2.300	19.589	-
CMV-22 Travel	WR	Various : Various	0.000	0.000		0.040	Sep 2018	0.040	Sep 2019	-		0.040	0.080	0.160	-
CMV-22 Engineering Tech Sppt	Various	Various : Various	0.000	0.000		0.409	Jan 2018	0.417	Jan 2019	-		0.417	0.800	1.626	-
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	1,324.653	1.908		2.374		2.417		-		2.417	27.189	1,358.541	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	9,202.125	149.113		171.386		143.079		-		143.079	651.358	10,317.061	N/A

Remarks

R-3 reflects correct CTC and Total Cost.

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
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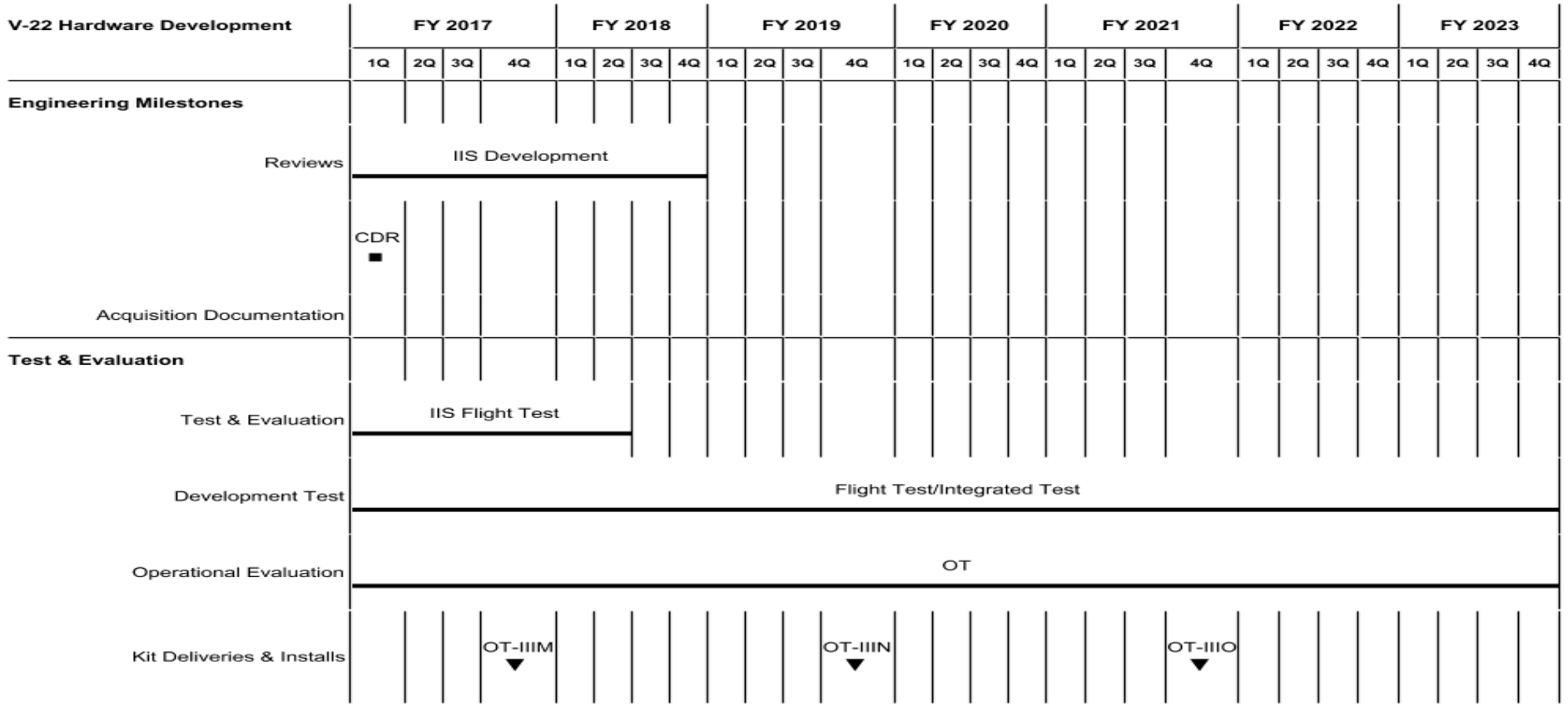

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*

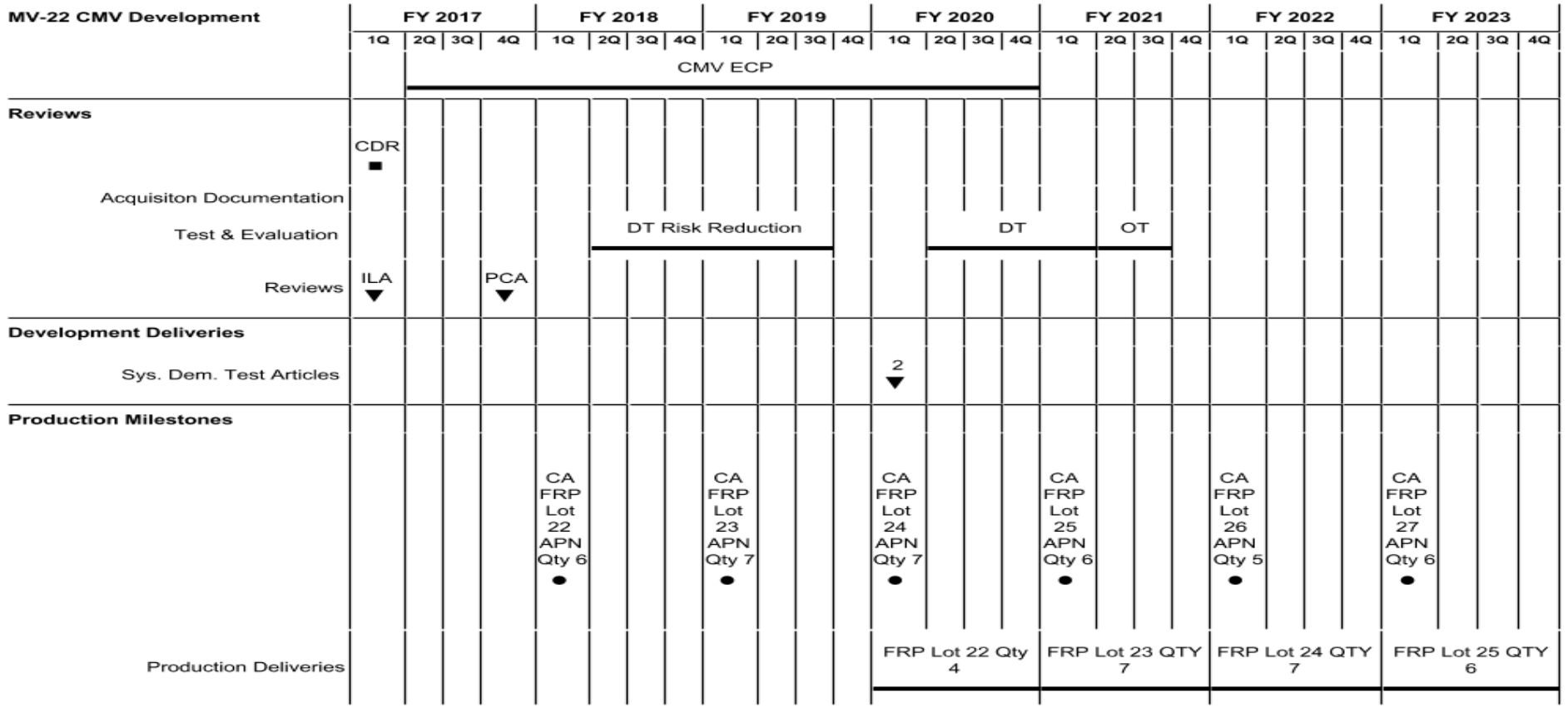

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
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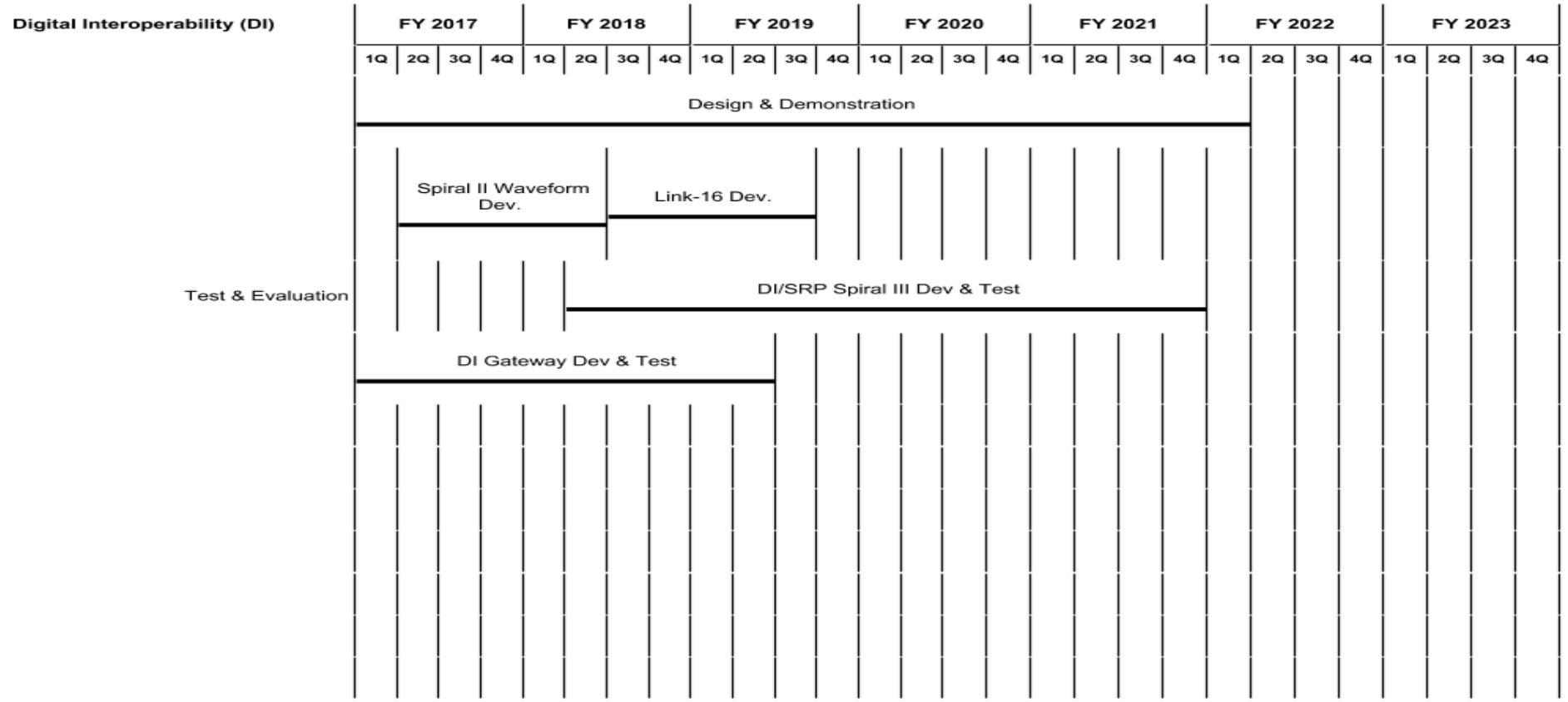

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
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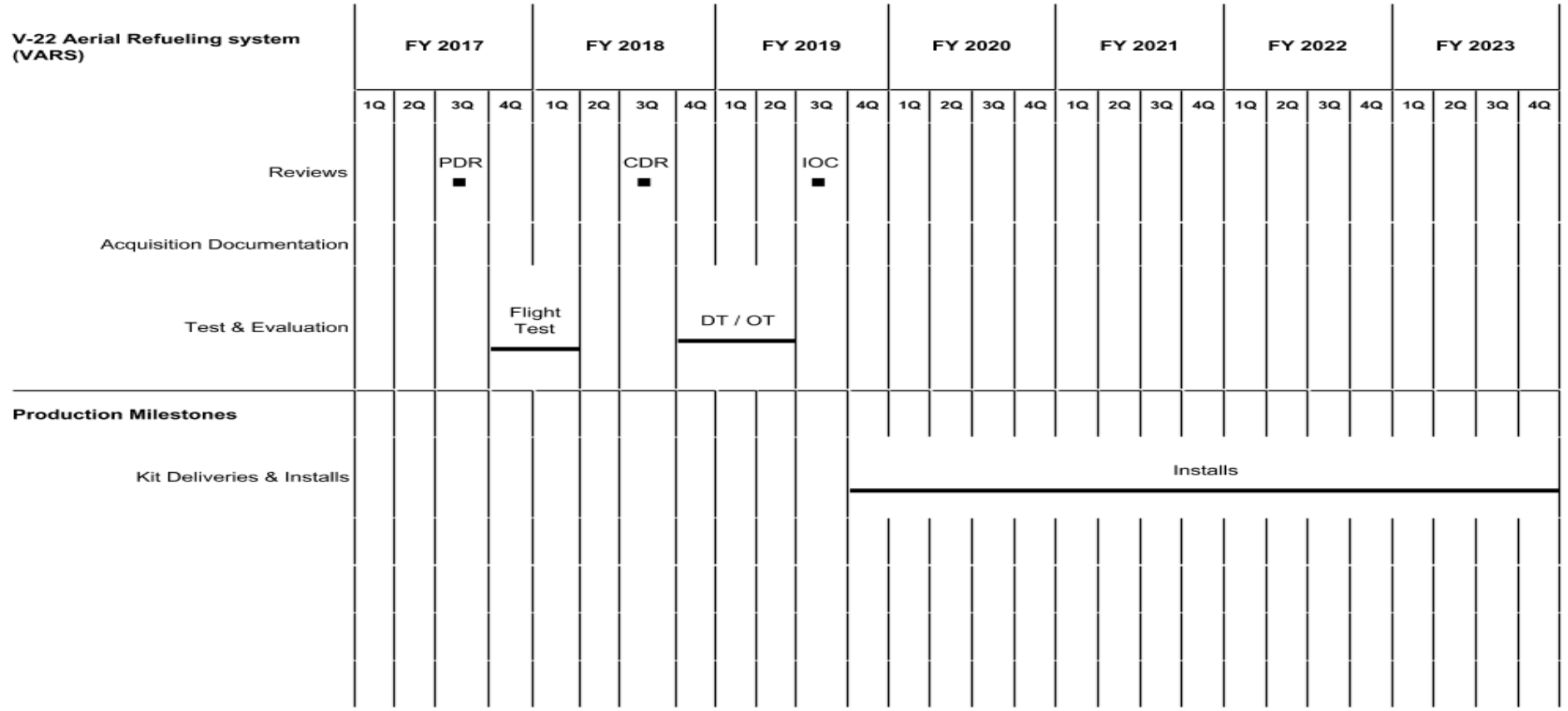

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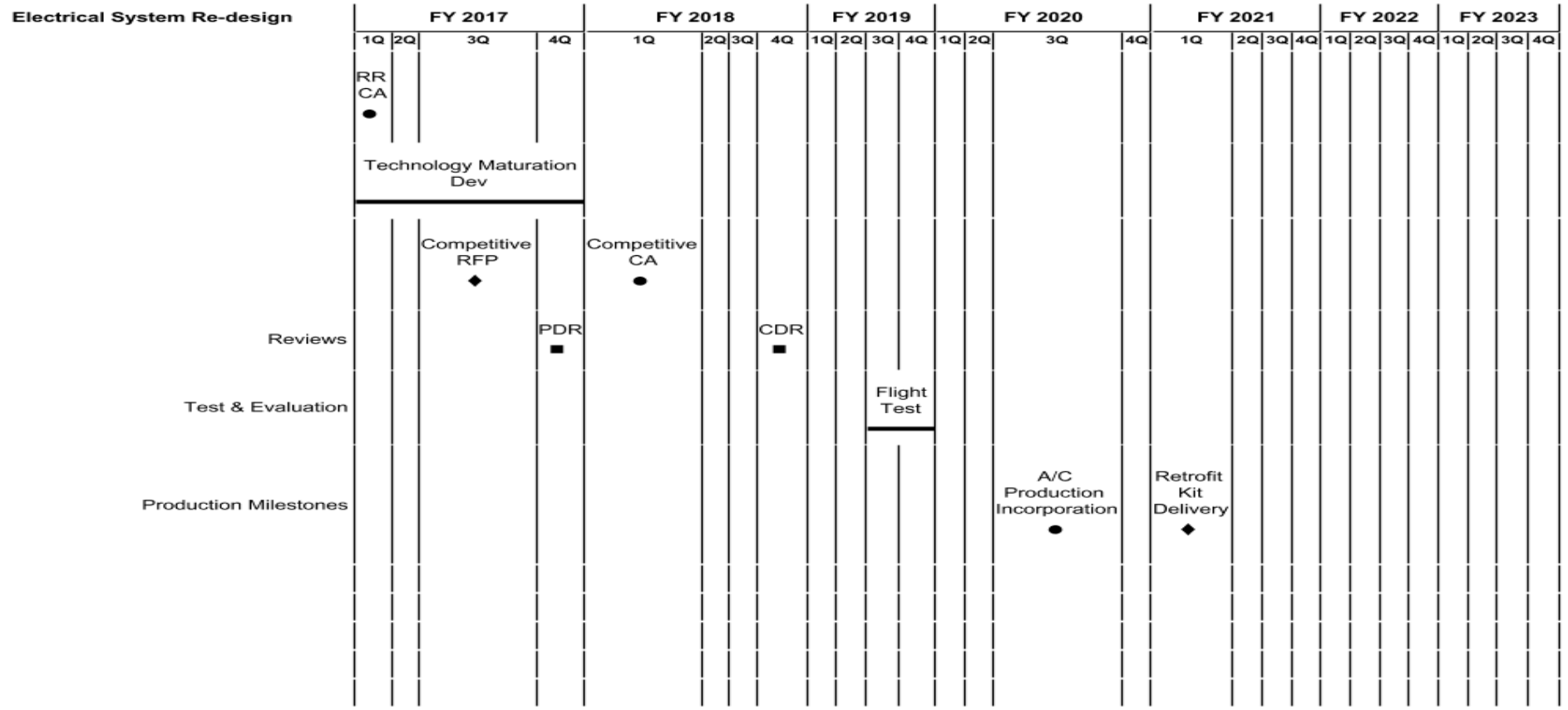

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
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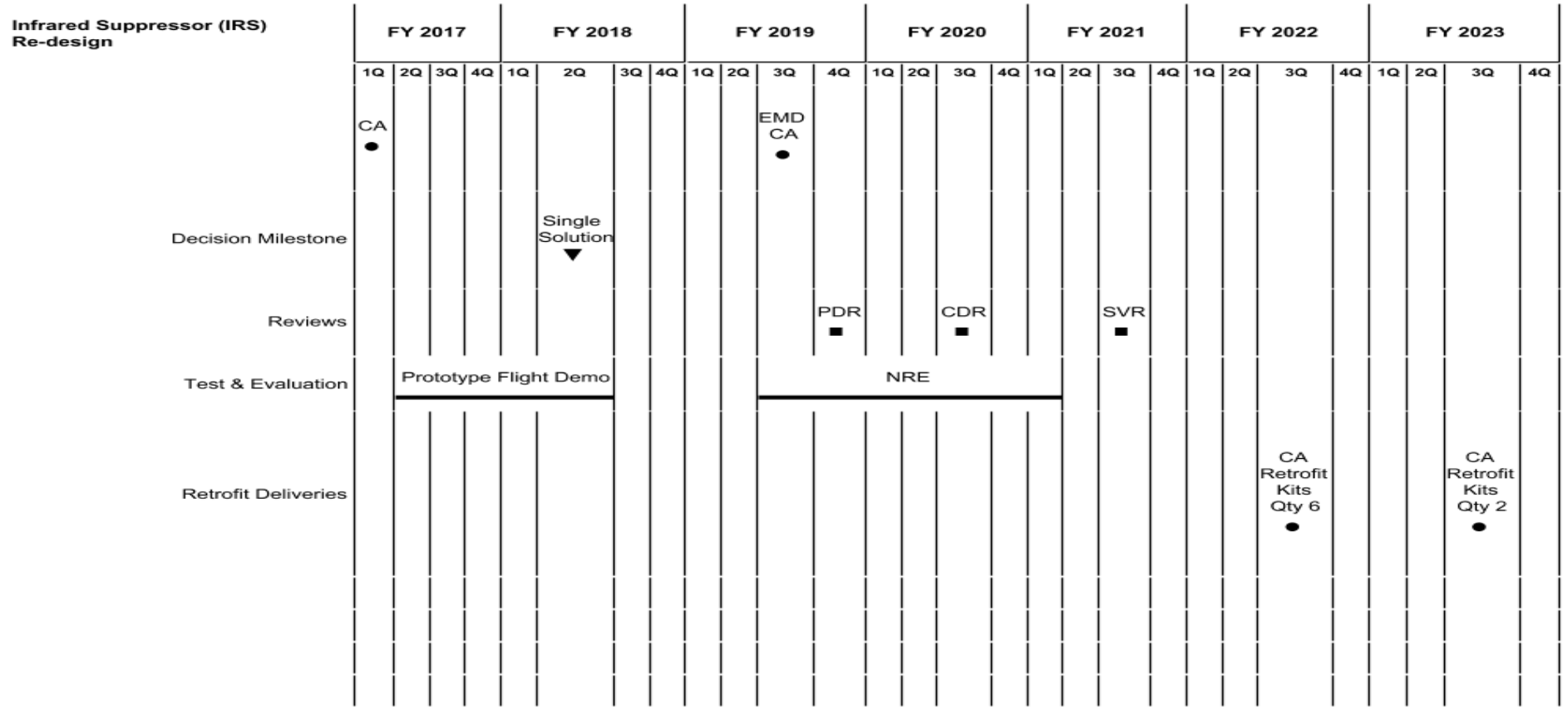

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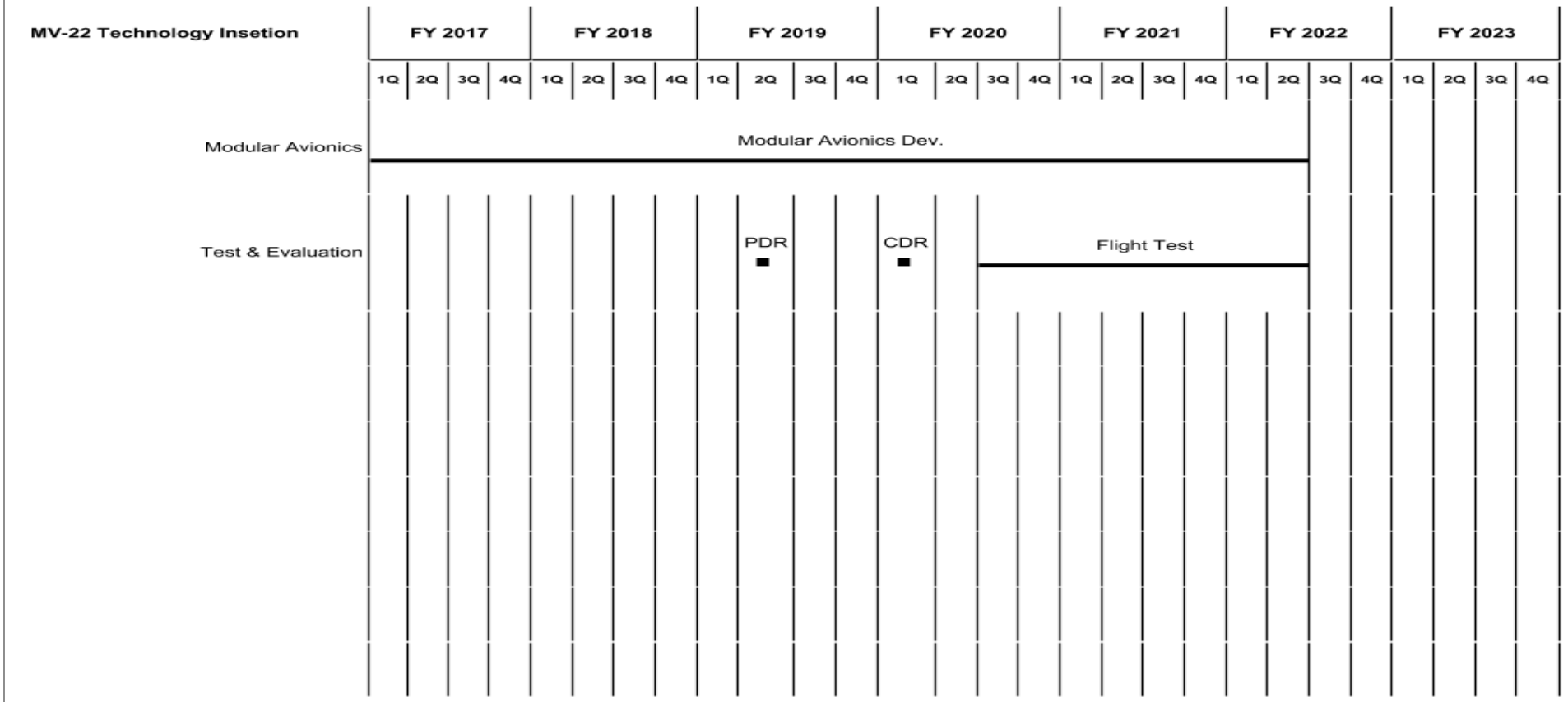

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
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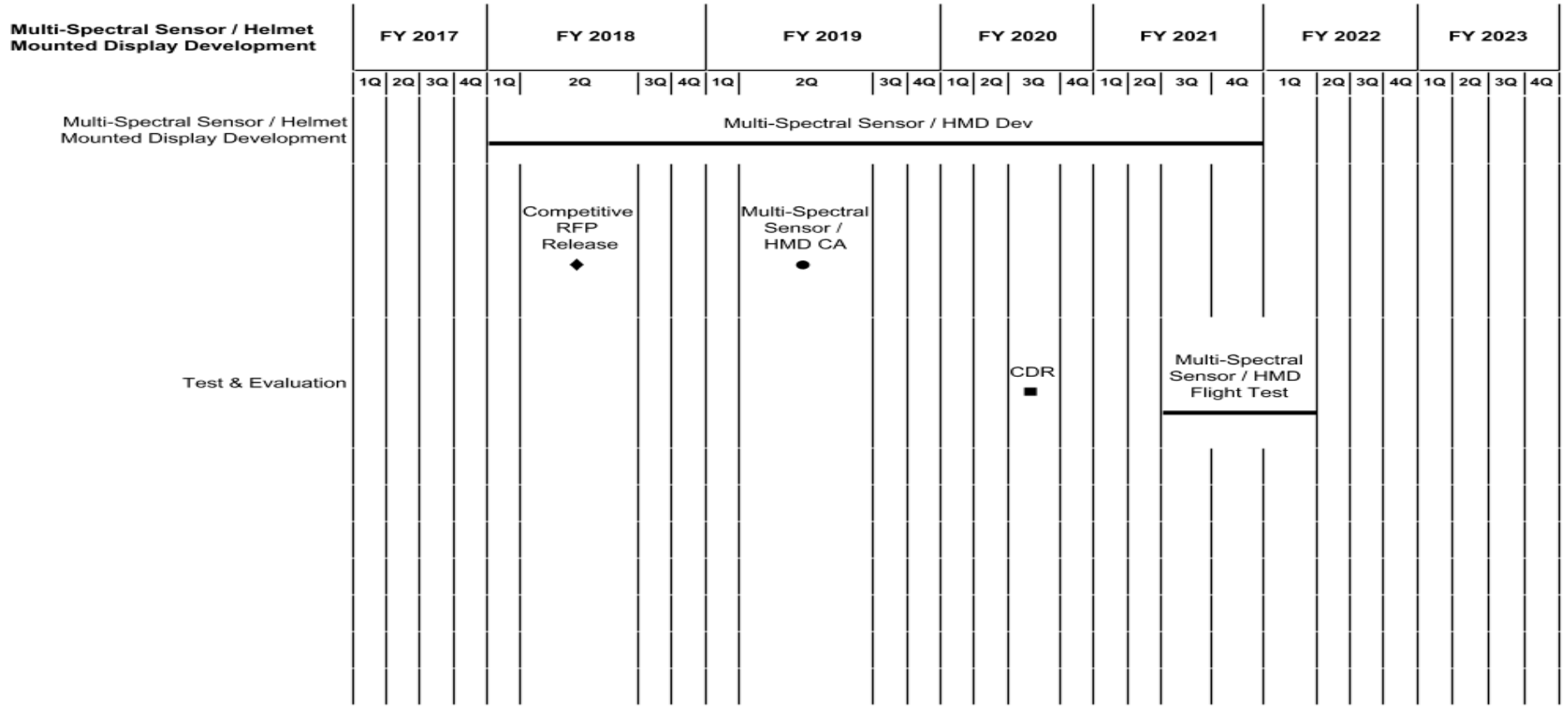
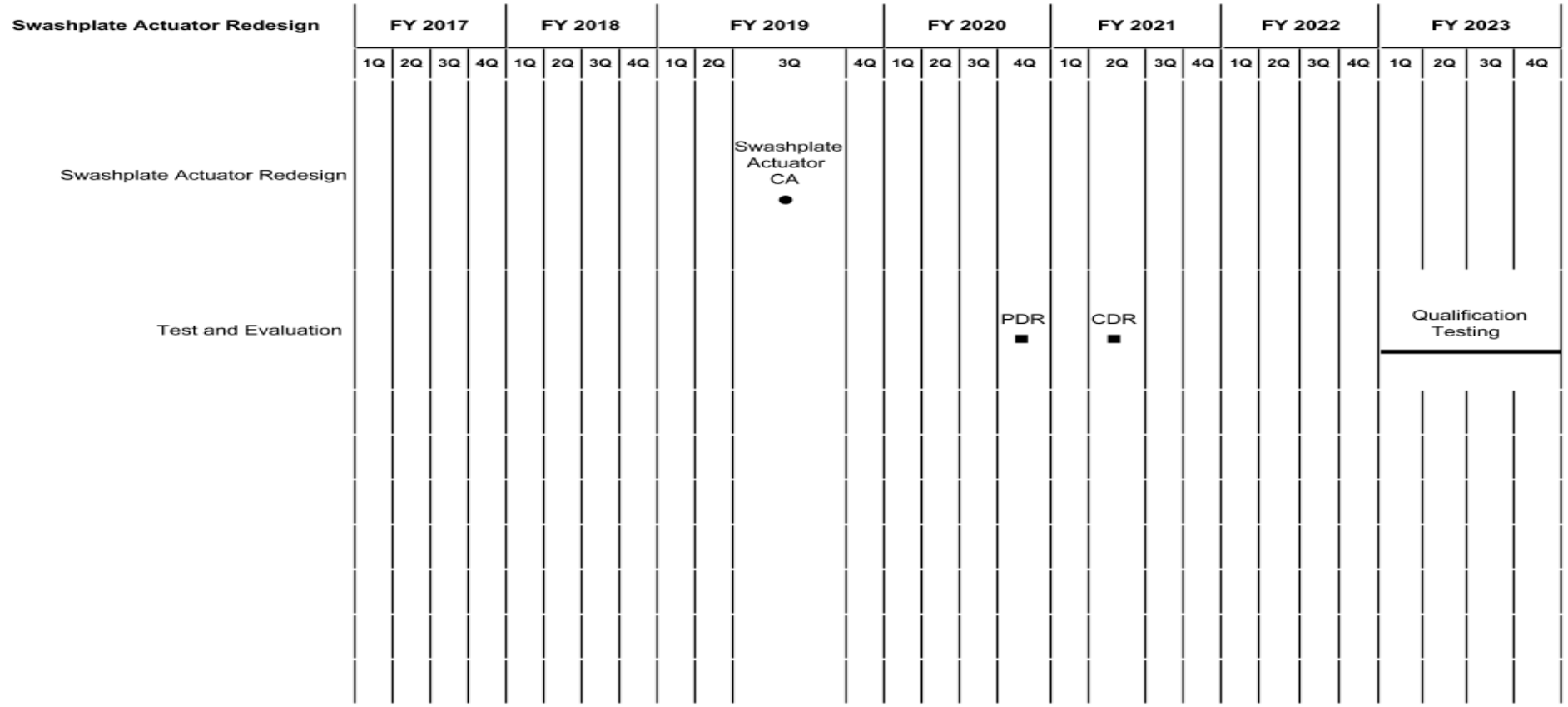


2019PB - 0604262N - 1425

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604262N / *V-22A*	**Project (Number/Name)** 1425 / *V-22*



2019PB - 0604262N - 1425

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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				
Engineering Milestones: Reviews: Improved Inlet Solution - Contract Award/ Development effort	1	2017	4	2018
Engineering Milestones: Reviews: Critical Design Review	1	2017	1	2017
Test & Evaluation: Test & Evaluation: IIS Flight Test	1	2017	2	2018
Test & Evaluation: Development Test: Development Flight Test / Integrated Test (IT-IIID) & Continuous software sustainment developmental testing	1	2017	4	2023
Test & Evaluation: Operational Evaluation: Operational Testing	1	2017	4	2023
Test & Evaluation: Kit Deliveries & Installs: Operational Testing (OT-IIIM)	4	2017	4	2017
Test & Evaluation: Kit Deliveries & Installs: Operational Testing (OT-IIIN)	4	2019	4	2019
Test & Evaluation: Kit Deliveries & Installs: Operational Testing (OT-IIIO)	4	2021	4	2021
MV-22 CMV Development				
Engineering Change Proposal	2	2017	4	2020
Reviews: Critical Design Review	1	2017	1	2017
Reviews: Test & Evaluation: Developmental Test Risk Reduction	2	2018	3	2019
Reviews: Test & Evaluation: Developmental Test	2	2020	1	2021
Reviews: Test & Evaluation: Operational Test	2	2021	3	2021
Reviews: Reviews: Integrated Logistics assessment	1	2017	1	2017
Reviews: Reviews: Physical Configuration Audit	4	2017	4	2017
Development Deliveries: Sys. Dem. Test Articles: Sys. Dem. Test Articles	1	2020	1	2020
Production Milestones: Lot 22 APN MV22 CMV Qty 6	1	2018	1	2018
Production Milestones: Lot 23 APN MV22 CMV Qty 7	1	2019	1	2019
Production Milestones: Lot 24 APN MV22 CMV Qty 7	1	2020	1	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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**
Production Milestones: Lot 25 APN MV22 CMV Qty 6	1	2021	1	2021
Production Milestones: Lot 26 APN MV22 CMV Qty 5	1	2022	1	2022
Production Milestones: Lot 27 APN MV22 CMV Qty 6	1	2023	1	2023
Production Milestones: Production Deliveries: Lot 22 APN CMV Qty 4	1	2020	4	2020
Production Milestones: Production Deliveries: Lot 23 APN CMV Qty 7	1	2021	4	2021
Production Milestones: Production Deliveries: Lot 24 APN CMV Qty 7	1	2022	4	2022
Production Milestones: Production Deliveries: Lot 25 APN CMV Qty 6	1	2023	4	2023
Digital Interoperability (DI)				
System Design & Demonstration	1	2017	1	2022
SRP Spiral II Waveform Dev.	2	2017	2	2018
Link-16 Dev./ntegration	3	2018	3	2019
Test & Evaluation: DI/SRP Spiral III Deveopment and Test	2	2018	4	2021
Test & Evaluation: DI Gateway Development & Test	1	2017	2	2019
V-22 Aerial Refueling system (VARS)				
Reviews: Preliminary Design Review	3	2017	3	2017
Reviews: Critical Design Review	3	2018	3	2018
Reviews: Initial Operational Capability	3	2019	3	2019
Test & Evaluation: Prototype Test	4	2017	1	2018
Test & Evaluation: Developmental Testing / Operational Testing	4	2018	2	2019
Production Milestones: Kit Deliveries & Installs: Installs	4	2019	4	2023
Electrical System Re-design				
Risk Reduction Contract Award	1	2017	1	2017
Technology Maturation Development	1	2017	4	2017
Competitive RFP	3	2017	3	2017
Competitive Contract Award	1	2018	1	2018
Reviews: Preliminary Design Review	4	2017	4	2017

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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: Critical Design Review	4	2018	4	2018
Test & Evaluation: Flight Test	3	2019	4	2019
Production Milestones: Aircraft Production Incorporation	3	2020	3	2020
Production Milestones: Retrofit Kit Delivery	1	2021	1	2021
Infrared Suppressor (IRS) Re-design				
Phase I Contract Awards	1	2017	1	2017
EMD Contract Award	3	2019	3	2019
Decision Milestone: Single Solution	2	2018	2	2018
Reviews: Preliminary Design Review	4	2019	4	2019
Reviews: Critical Design Review	3	2020	3	2020
Reviews: System Verification Review	3	2021	3	2021
Test & Evaluation: Prototype Flight Demonstrations	2	2017	2	2018
Test & Evaluation: Non-Recurring Engineering	3	2019	1	2021
Retrofit Deliveries: IRS Kits Qty 6 Contract Award	3	2022	3	2022
Retrofit Deliveries: IRS Kits Qty 2	3	2023	3	2023
MV-22 Technology Insetion				
Modular Avionics: Modular Avionics Deveopment	1	2017	2	2022
Test & Evaluation: Preliminary Design Review	2	2019	2	2019
Test & Evaluation: Modular Avionics Critical Design Review	1	2020	1	2020
Test & Evaluation: Modular Avionics Critical Flight Test	3	2020	2	2022
Multi-Spectral Sensor / Helmet Mounted Display Development				
Multi-Spectral Sensor / Helmet Mounted Display Development: Multi-Spectral Sensor / Helmet Mounted Display Development	1	2018	4	2021
Multi-Spectral Sensor / Helmet Mounted Display Development: Competitive RFP Release	2	2018	2	2018
Multi-Spectral Sensor / Helmet Mounted Display Development: Multi-Spectral Sensor / Helmet Mounted Display Development CA	2	2019	2	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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**
Test & Evaluation: Critical Design Review	3	2020	3	2020
Test & Evaluation: Flight Test	3	2021	1	2022
Swashplate Actuator Redesign				
Swashplate Actuator Redesign: Swashplate Actuator CA	3	2019	3	2019
Test and Evaluation: Preliminary Design Review	4	2020	4	2020
Test and Evaluation: Critical Design Review	2	2021	2	2021
Test and Evaluation: Qualification Testing	1	2023	4	2023