| Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force | | | | | | | | | | | Date: February 2015 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | | | | | R-1 Program Element (Number/Name)<br>PE 0401318F / *CV-22* | | | | | | | |
| **COST ($ in Millions)** | **Prior Years** | **FY 2014** | **FY 2015** | **FY 2016 Base** | **FY 2016 OCO** | **FY 2016 Total** | **FY 2017** | **FY 2018** | **FY 2019** | **FY 2020** | **Cost To Complete** | **Total Cost** |
| Total Program Element | 0.000 | - | 38.719 | 36.576 | - | 36.576 | 17.369 | 14.324 | 14.595 | 14.856 | 74.005 | 210.444 |
| 676033: *CV-22 RDT&E POST PRODUCTION* | 0.000 | - | 38.719 | 36.576 | - | 36.576 | 17.369 | 14.324 | 14.595 | 14.856 | 74.005 | 210.444 |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

**Program MDAP/MAIS Code:** 212
**Project MDAP/MAIS Code(s):** N42

**Note**

In FY2015, PE 0401318F (BA05), CV-22, Project 654103 CV-22, efforts were transferred to PE 0401318F (BA07), CV-22, Project 676033 CV-22 RDT&E Post Production in order to align efforts in Budget Activity 07, Operational System Development, since CV-22 has been fielded.

In FY2016, Project 676033 includes new start effort for Aircraft Electrical Power upgrade.

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

The CV-22 is a Special Operations Forces (SOF) variant of the 1st generation V-22 tilt-rotor, multi-mission aircraft. CV-22 RDT&E funding provides for development, integration, testing, and enhancement of mission critical capabilities to insert, extract, and re-supply SOF in politically and/or militarily denied areas.

Block 20: RDT&E funding provides for improved long-range communications, situational awareness capabilities, and additional aircraft software upgrades needed to address operational requirements specified in the V-22 Block C/20 Capabilities Production Document.

Enhanced Self-Deployment: RDT&E funding provides for the design, development, and testing of aircraft modifications to improve aircraft self-deployment capabilities (e.g., operating range, global response time).

Improved Inlet Solution (IIS): RDT&E funding provides for design, development, and testing of modifications to the CV-22 propulsion system to reduce ingestion of sand/dust and other particulate matter in austere operating environments. These upgrades will signficantly improve engine Time on Wing (TOW) and overall aircraft readiness/availability, and reduce platform operating/life cycle costs.

Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM): RDT&E funding provides for upgrades and enhancements to the CV-22 navigation, flight management, and aircraft Identification Friend or Foe (IFF) systems that will bring the aircraft into compliance with Federal Aviation Administration (FAA) and international mandates and other technical guidance for access to, and operations within worldwide airspace.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force | Date: February 2015 |
|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* |

Aircraft Electrical Power: RDT&E funding provides for upgrades to the CV-22 electrical power distribution system to meet the power demands of on-going and planned avionics system improvements. This modification also addresses single-point failure modes in the aircraft Variable Frequency Generator (VFG) system that put aircraft and flight crew at risk from disabled ice protection, avionics cooling, and fuel management systems. Additionally, components in the VFG have experienced poor reliability, high failure rates, and long repair turnaround times. This upgrade will provide more of the needed electrical power than the current system is capable of supplying.

Other/Future Capabilities: The V-22 Joint Program Office continually assesses user-specified requirements for improved operational safety, suitability, and mission effectiveness. Funding also provides for future modification planning, and for aircraft engineering changes/upgrades to address diminishing manufacturing source (DMS) and component obsolescence issues that adversely effect aircraft readiness and operational availability rates.

USSOCOM and USAF jointly fund many CV-22 development projects. USSOCOM funds the development, integration and testing of SOF-unique mission equipment/ capabilities, while the USAF funds service-common/basic air vehicle enhancements, CV-22 implementation and testing of MV-22 configuration changes, integration of Air Force and Navy maintenance and information systems used with the CV-22, and support for aircraft qualification and operational testing. USSOCOM and USAF jointly fund corrective measures for identified aircraft deficiencies, and for Block 20 development. Block 20 Increments 1 and 3 were developed with USAF funds, and Increment 2 was developed with USSOCOM funds.

This program is in Budget Activity 7, Operational Systems Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current year.

In FY2016, Project 676033 includes new start effort for Aircraft Electrical Power upgrade.

| B. Program Change Summary ($ in Millions) | FY 2014 | FY 2015 | FY 2016 Base | FY 2016 OCO | FY 2016 Total |
|---|---|---|---|---|---|
| Previous President's Budget | - | 38.719 | 26.422 | - | 26.422 |
| Current President's Budget | - | 38.719 | 36.576 | - | 36.576 |
| Total Adjustments | - | - | 10.154 | - | 10.154 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | - | - | | | |
| • Other Adjustments | - | - | 10.154 | - | 10.154 |

**Change Summary Explanation**

The CV-22 RDT&E budget transitioned from BA05 System Development & Demonstration (SDD) to BA07 Operational Systems Development in FY2015.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force | | Date: February 2015 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* | |

FY16: Funding increase for Improved Inlet Solution (IIS) development and testing activities

| C. Accomplishments/Planned Programs ($ in Millions) | FY 2014 | FY 2015 | FY 2016 Base | FY 2016 OCO | FY 2016 Total |
|---|---|---|---|---|---|
| ***Title:*** CV-22 Block 20 RDT&E<br>***Description:*** Develop, test, and evaluate additional capabilities for the CV-22 aircraft. The V-22 Joint Program Office is developing improved operational safety, suitability, and effectiveness configuration changes. Block 20 development includes improved communications, software, and other requirements specified in the V-22 Block C/20 Capabilities Production Document.<br>***FY 2014 Accomplishments:***<br>See BA05 Program Element 0401318F CV-22 for FY14 activities and funding.<br>***FY 2015 Plans:***<br>Beyond Line of Sight (BLOS) communications system ground and flight testing<br>***FY 2016 Base Plans:***<br>N/A<br>***FY 2016 OCO Plans:***<br>N/A | - | 12.940 | - | - | - |
| ***Title:*** Enhanced Self-Deployment Capabilities<br>***Description:*** Future capabilities increment to enhance self-deployment capabilities such as improved ice protection, engine performance, navigation, communications, and networking capabilities; weapons systems; defensive systems; weight reduction initiatives; and changes to the underlying aircraft systems necessary to enable these capabilities. The enhanced self-deployment capabilities major thrust contains funding for the initial risk reduction and trade studies that may result in other major thrusts.<br>***FY 2014 Accomplishments:***<br>See BA05 Program Element 0401318F CV-22 for FY14 activities and funding.<br>***FY 2015 Plans:***<br>Conduct risk reduction and assessment of emerging operational capability requirements and existing technologies/solutions.<br>***FY 2016 Base Plans:*** | - | 3.900 | 12.214 | - | 12.214 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force | | Date: February 2015 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* | |

| C. Accomplishments/Planned Programs ($ in Millions) | FY 2014 | FY 2015 | FY 2016 Base | FY 2016 OCO | FY 2016 Total |
|---|---|---|---|---|---|
| Conduct risk reduction and assessment of emerging and existing technologies (e.g., weapon systems, improved engine performance, and weight reduction initiatives). Start design/development to integrate Intelligence Broadcast Receiver upgrade (obsolescence issue).<br>***FY 2016 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Improved Inlet Solution (IIS)<br>***Description:*** Provides for modifications to the CV-22 propulsion system to reduce sand/dust and other particulate matter ingestion, increase engine time on wing and overall aircraft readiness/availability rates, and reduce operations and support costs. This is Air Force Special Operations Command's #1 modification priority for the CV-22 weapon system.<br>IIS is a joint V-22 effort being developed in conjunction with the Department of the Navy.<br>***FY 2014 Accomplishments:***<br>See BA05 Program Element 0401318F CV-22 for FY14 activities and funding.<br>***FY 2015 Plans:***<br>Continue design and development. Conduct Preliminary Design Review (PDR). Purchase modification kit and instrumentation for flight test aircraft.<br>***FY 2016 Base Plans:***<br>Continue design and development. Conduct Critical Design Review (CDR). Conduct wind tunnel icing test.<br>***FY 2016 OCO Plans:***<br>N/A | - | 14.179 | 19.396 | - | 19.396 |
| ***Title:*** Communication, Navigation, Surveillance / Air Traffic Management (CNS/ATM)<br>***Description:*** Improvements to current navigation, flight management, and Identification Friend or Foe (IFF) systems that will bring the CV-22 into compliance with US and international mandates and other technical guidance for continued access to, and interoperability with worldwide airspace.<br>***FY 2014 Accomplishments:*** | - | 7.700 | 3.200 | - | 3.200 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force | | Date: February 2015 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* | |

| C. Accomplishments/Planned Programs ($ in Millions) | FY 2014 | FY 2015 | FY 2016 Base | FY 2016 OCO | FY 2016 Total |
|---|---|---|---|---|---|
| N/A<br>***FY 2015 Plans:***<br>Conduct Crew Systems Design, Display Interface Documentation and SRR for RNAV(GPS).<br>***FY 2016 Base Plans:***<br>Joint Avionics Software Suite (JASS) and Display Software Development SRR<br>JASS and Display Software Development PDR<br>Mission Planning Software Development SRR<br>Mission Planning Software Development PDR<br>***FY 2016 OCO Plans:***<br>N/A | | | | | |
| ***Title:*** Aircraft Electrical Power<br>***Description:*** Re-design power distribution system.<br><br>This is a joint V-22 effort being developed in conjunction with the Department of the Navy.<br><br>This project is a FY2016 new start.<br>***FY 2014 Accomplishments:***<br>N/A<br>***FY 2015 Plans:***<br>N/A<br>***FY 2016 Base Plans:***<br>Start design/development activities for Generator Control Unit<br>***FY 2016 OCO Plans:***<br>N/A | - | - | 1.766 | - | 1.766 |
| **Accomplishments/Planned Programs Subtotals** | - | 38.719 | 36.576 | - | 36.576 |

| Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force | Date: February 2015 |
|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* |

**D. Other Program Funding Summary ($ in Millions)**

| Line Item | FY 2014 | FY 2015 | FY 2016 Base | FY 2016 OCO | FY 2016 Total | FY 2017 | FY 2018 | FY 2019 | FY 2020 | Cost To Complete | Total Cost |
|---|---|---|---|---|---|---|---|---|---|---|---|
| • RDT&E: BA05: PE 0401318F: *CV-22* | 46.705 | - | - | - | - | - | - | - | - | - | 415.035 |
| • RDT&E: BA07: PE 1160421BB: *Special Operations, CV-22 Development* | - | - | - | - | - | - | - | - | - | - | 520.411 |
| • RDT&E: BA07: PE 1160403BB: *Special Operations, Aviation Systems* | 2.817 | 0.182 | - | - | - | 0.707 | 14.372 | 21.806 | - | - | 39.884 |
| • APAF: BA02: Line Item #1000CV2200: *CV-22 Modification* | 104.199 | 21.578 | 18.832 | - | 18.832 | 20.158 | 18.522 | 23.307 | 21.505 | - | 1,713.822 |
| • APAF: BA04: Line Item #V022A0: *CV-22 (MYP)* | 285.998 | 15.000 | - | - | - | - | - | - | - | - | 4,244.528 |
| • APAF: BA05: Line Item #V02200: *CV-22 Mods* | 19.555 | 74.874 | 58.828 | - | 58.828 | 63.960 | 66.420 | 69.400 | 71.367 | 138.529 | 692.634 |
| • APAF: BA07: B00100: *CV-22 Post-Production Support* | - | 16.931 | 3.353 | - | 3.353 | - | - | - | - | - | 20.284 |
| • RDT&E: BA005: PE 0604262N: *V-22A* | 42.205 | 57.749 | 87.918 | - | 87.918 | 138.217 | 126.239 | 88.584 | 56.037 | 245.000 | 9,879.554 |

**Remarks**

**E. Acquisition Strategy**

The V-22 Joint Program Office NAVAIRSYSCOM PMA-275 is developing new capabilities for the V-22 in block increments. Block 0 and Block 10 have been developed & fielded, and Block 20 development is scheduled to complete 31 Dec 2015. NAVAIRSYSCOM awarded a cost plus fixed fee contract for IIS development and test in June 2014 with BA05 funds. After FY14, BA07 funds continue this effort. CNS/ATM development will be contracted with Raytheon and Bell-Boeing. The FY15 effort will be purchased sole source on a delivery order to an existing IDIQ (Indefinite Delivery Indefinite Quantity) contract with Raytheon. The FY16 effort will be purchased sole source on a delivery order to an existing BOA (Basic Ordering Agreement) with Bell-Boeing.

Development activities for the V-22 program are performed primarily by the prime contractor, Bell-Boeing, selected on a sole-source basis. Bell-Boeing is a strategic partnership between Bell Helicopter and Boeing Integrated Defense Systems. Efforts are underway to increase competition where feasible, depending primarily on the level of platform integration required.

OSD re-designated the V-22 program from ACAT ID to ACAT IC on 24 Jul 2012.

| Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force | Date: February 2015 |
|---|---|
| **Appropriation/Budget Activity**<br>3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development* | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* |

**F. Performance Metrics**

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Air Force | | Date: February 2015 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600 / 7 | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* | **Project (Number/Name)**<br>676033 / *CV-22 RDT&E POST PRODUCTION* |

**Product Development ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2014 Cost | FY 2014 Award Date | FY 2015 Cost | FY 2015 Award Date | FY 2016 Base Cost | FY 2016 Base Award Date | FY 2016 OCO Cost | FY 2016 OCO Award Date | FY 2016 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CV-22 Osprey Block 20 Development | SS/CPFF | Bell Boeing : Amarillo, TX | 0.000 | - | | 7.420 | Feb 2015 | - | | - | | - | - | 7.420 | 161.014 |
| CV-22 Osprey Enhanced Self-deployment Capability | Various | Various : Various, | 0.000 | - | | 3.900 | Mar 2015 | 8.519 | Mar 2016 | - | | 8.519 | 76.524 | 88.943 | - |
| CV-22 Osprey Improved Inlet Solution (IIS) | SS/CPFF | Bell Boeing : Amarillo, TX | 0.000 | - | | 14.179 | Feb 2015 | 15.396 | Dec 2015 | - | | 15.396 | 9.958 | 39.533 | 69.660 |
| CV-22 Osprey CNS/ATM | SS/CPFF | Various : Various, | 0.000 | - | | 5.700 | Jul 2015 | 3.200 | Feb 2016 | - | | 3.200 | 1.226 | 10.126 | - |
| CV-22 Osprey Aircraft Electrical Power | SS/CPFF | Bell Boeing : Amarillo, TX | 0.000 | - | | - | | 1.766 | Jun 2016 | - | | 1.766 | 13.799 | 15.565 | - |
| | | **Subtotal** | 0.000 | - | | 31.199 | | 28.881 | | - | | 28.881 | 101.507 | 161.587 | - |

**Remarks**

Block 20 Development Target Value of Contract differs from total cost because most of the Block 20 development cost is shown in BA05 PE 0401318F. In addition, the Special Operations Forces (SOF) peculiar development efforts were funded by USSOCOM MFP-11 funding.

IIS Development Target Value of Contract differs from total cost because this is a Joint development funded by Navy and Air Force. Navy funding for IIS is shown in RDT&E,N PE 0604262N budget exhibit.

**Support ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2014 Cost | FY 2014 Award Date | FY 2015 Cost | FY 2015 Award Date | FY 2016 Base Cost | FY 2016 Base Award Date | FY 2016 OCO Cost | FY 2016 OCO Award Date | FY 2016 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Subtotal** | - | - | | - | | - | | - | | - | - | - | - |

**Test and Evaluation ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2014 Cost | FY 2014 Award Date | FY 2015 Cost | FY 2015 Award Date | FY 2016 Base Cost | FY 2016 Base Award Date | FY 2016 OCO Cost | FY 2016 OCO Award Date | FY 2016 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CV-22 Osprey Test & Evaluation Technical Support | MIPR | Various : Various, | 0.000 | - | | 2.420 | Feb 2015 | 2.468 | Dec 2015 | - | | 2.468 | 18.714 | 23.602 | - |
| | | **Subtotal** | 0.000 | - | | 2.420 | | 2.468 | | - | | 2.468 | 18.714 | 23.602 | - |

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Air Force | | | Date: February 2015 |
|---|---|---|---|
| Appropriation/Budget Activity<br>3600 / 7 | R-1 Program Element (Number/Name)<br>PE 0401318F / *CV-22* | Project (Number/Name)<br>676033 / *CV-22 RDT&E POST PRODUCTION* | |

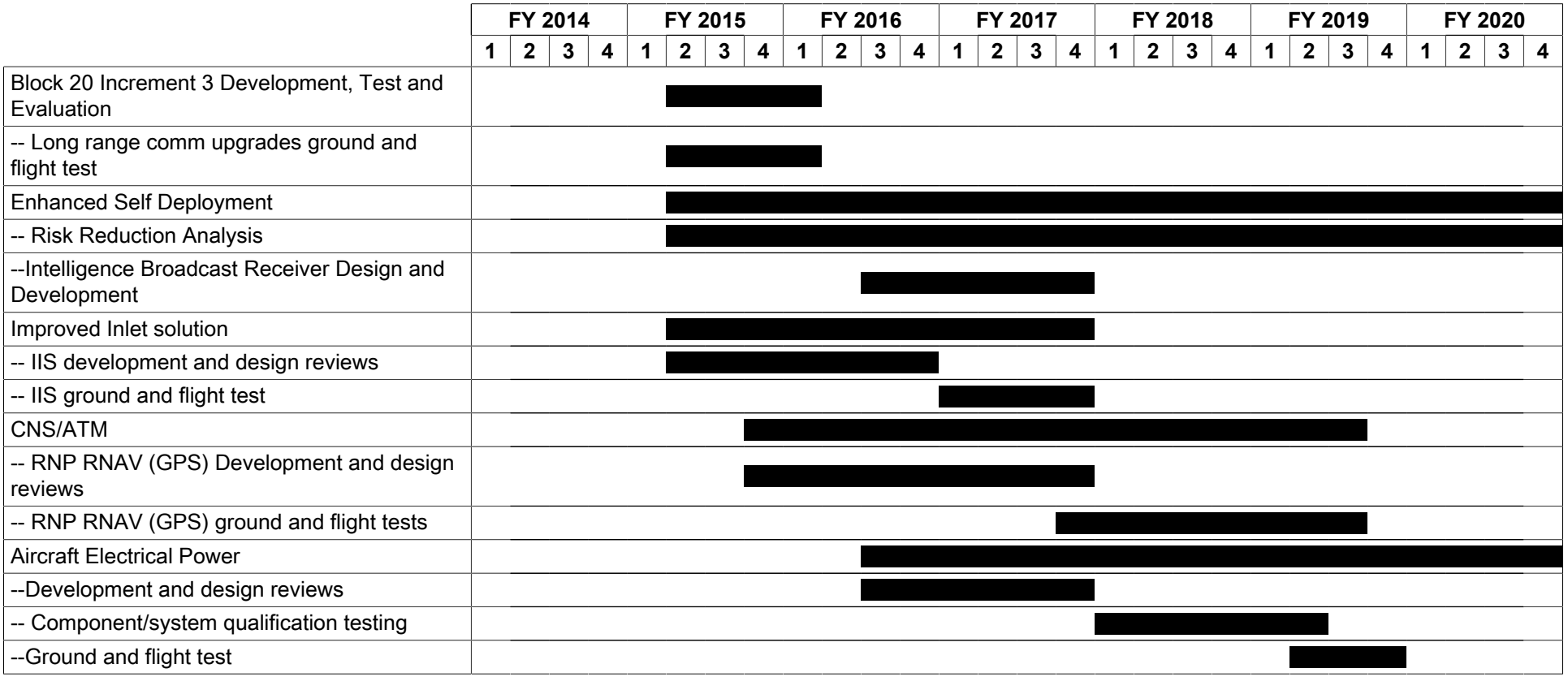
**Management Services ($ in Millions)**

| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | FY 2014 Cost | FY 2014 Award Date | FY 2015 Cost | FY 2015 Award Date | FY 2016 Base Cost | FY 2016 Base Award Date | FY 2016 OCO Cost | FY 2016 OCO Award Date | FY 2016 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CV-22 Osprey PMA/Travel | Allot | AFLCMC/WIV : Patuxent River, MD | 0.000 | - | | 5.100 | Jan 2015 | 5.227 | Nov 2015 | - | | 5.227 | 14.928 | 25.255 | - |
| | | **Subtotal** | 0.000 | - | | 5.100 | | 5.227 | | - | | 5.227 | 14.928 | 25.255 | - |

| | Prior Years | FY 2014 Cost | FY 2014 Award Date | FY 2015 Cost | FY 2015 Award Date | FY 2016 Base Cost | FY 2016 Base Award Date | FY 2016 OCO Cost | FY 2016 OCO Award Date | FY 2016 Total Cost | Cost To Complete | Total Cost | Target Value of Contract |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Cost Totals** | 0.000 | - | | 38.719 | | 36.576 | | - | | 36.576 | 135.149 | 210.444 | - |

**Remarks**

| Exhibit R-4, RDT&E Schedule Profile: PB 2016 Air Force | | Date: February 2015 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600 / 7 | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* | **Project (Number/Name)**<br>676033 / *CV-22 RDT&E POST PRODUCTION* |



| Exhibit R-4A, RDT&E Schedule Details: PB 2016 Air Force | | Date: February 2015 |
|---|---|---|
| **Appropriation/Budget Activity**<br>3600 / 7 | **R-1 Program Element (Number/Name)**<br>PE 0401318F / *CV-22* | **Project (Number/Name)**<br>676033 / *CV-22 RDT&E POST PRODUCTION* |

## Schedule Details

| | Start | | End | |
|---|---|---|---|---|
| **Events** | **Quarter** | **Year** | **Quarter** | **Year** |
| Block 20 Increment 3 Development, Test and Evaluation | 2 | 2015 | 1 | 2016 |
| -- Long range comm upgrades ground and flight test | 2 | 2015 | 1 | 2016 |
| Enhanced Self Deployment | 2 | 2015 | 4 | 2020 |
| -- Risk Reduction Analysis | 2 | 2015 | 4 | 2020 |
| --Intelligence Broadcast Receiver Design and Development | 3 | 2016 | 4 | 2017 |
| Improved Inlet solution | 2 | 2015 | 4 | 2017 |
| -- IIS development and design reviews | 2 | 2015 | 4 | 2016 |
| -- IIS ground and flight test | 1 | 2017 | 4 | 2017 |
| CNS/ATM | 4 | 2015 | 3 | 2019 |
| -- RNP RNAV (GPS) Development and design reviews | 4 | 2015 | 4 | 2017 |
| -- RNP RNAV (GPS) ground and flight tests | 4 | 2017 | 3 | 2019 |
| Aircraft Electrical Power | 3 | 2016 | 4 | 2020 |
| --Development and design reviews | 3 | 2016 | 4 | 2017 |
| -- Component/system qualification testing | 1 | 2018 | 2 | 2019 |
| --Ground and flight test | 2 | 2019 | 4 | 2019 |