Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force												Date: May 2017
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0401318F / *CV-22*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	37.698	26.821	28.702	22.519	0.000	22.519	16.641	14.731	14.985	15.293	41.970	219.360
676033: *CV-22 RDT&E POST PRODUCTION*	37.698	26.821	28.702	22.519	0.000	22.519	16.641	14.731	14.985	15.293	41.970	219.360
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Note

Improved Inlet Solution (IIS) project title changed to Nacelle Improvements.

A. Mission Description and Budget Item Justification

The CV-22 is the Air Force Special Operations Forces (SOF) variant of the joint multi-mission V-22 tilt-rotor aircraft. The aircraft provides long-range infiltration, exfiltration, and re-supply of SOF in politically sensitive and hostile/denied areas. The Navy is the lead service for the joint V-22 program and has overall responsibility for managing all V-22 variants, including the Air Force CV-22 variant. CV-22 RDT&E funding provides for the development, integration, and testing of mission critical aircraft modifications to improve operational effectiveness, platform survivability, and aircraft availability.

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

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), to evaluate emerging threats to the aircraft and mission accomplishment, and to identify and assess emerging air vehicle, propulsion system, avionics, electronic warfare, and weapon system capability requirements and potential solutions to satisfy these requirements.

Nacelle Improvements (Formerly Improved Inlet Solution IIS): RDT&E funding provides for design, development, and testing of V-22 Nacelle Improvements. This major budget thrust was formerly met by the IIS program. During IIS development, it was realized there are other components in the V-22 nacelle that require readiness improvements and can benefit from the synergy of development simultaneous with IIS; including, but not limited to, the Infrared Suppressor (IRS), Generator Control Unit (GCU), nacelle wiring, heat exchanger, and the nacelle structure. The IIS major budget thrust scope has been expanded to encompass these broader common nacelle improvements for both the CV-22 and MV-22 fleets. These improvements will increase Engine Time on Wing (ETOW) and overall aircraft readiness/availability, reduce platform operating life cycle costs, and mitigate impacts to aircraft performance. These improvements will be integrated, tested, and fielded as a single modification to minimize cost and impact on fleet operations and readiness.

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force	Date: May 2017
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*

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 affect aircraft readiness and operational availability rates.

Unites States Special Operations Command (USSOCOM) and the Air Force (AF) jointly fund many CV-22 development projects. USSOCOM funds the development, integration, and testing of SOF-unique mission equipment and capabilities, while the AF funds service-common/basic air vehicle enhancements, CV-22 implementation, and testing of MV-22 configuration changes, the 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 AF jointly fund corrective measures for identified aircraft deficiencies, and for Block 20 development. Block 20 Increments 1 and 3 were developed with AF 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 or subsequent fiscal year.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	27.776	16.702	17.455	0.000	17.455
Current President's Budget	26.821	28.702	22.519	0.000	22.519
Total Adjustments	-0.955	12.000	5.064	0.000	5.064
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.955	0.000			
• Other Adjustments	0.000	12.000	5.064	0.000	5.064

Change Summary Explanation

FY17: The Request for Additional Appropriations (RAA) increased the FY17 budget by $12M to address emergency warfighting readiness requirements.

FY18: The FY2018 funding was increased by $5.064 million for IBS SIRFC Ethernet, DIRCM ATW (LSPR), and Nacelle Improvements (formerly Improved Inlet Solution (IIS)).

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Enhanced Self-Deployment Capabilities	16.225	14.182	5.548	0.000	5.548

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*	

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Description: Incrementally develops capabilities to enhance self-deployment capabilities, such as improved ice protection, engine performance, navigation, communications, and battle space awareness/networking capabilities; electronic warfare; weapons systems; defensive avionics systems; weight reduction initiatives; modular avionics/cyber security implementation; airborne networking, and changes to the underlying aircraft systems necessary to enable these capabilities. The enhanced self-deployment capabilities major thrust contains funding for initial risk reduction and trade studies that may impact other existing major thrusts, or result in new major thrusts. ***FY 2016 Accomplishments:*** Conducted risk reduction and assessment of emerging and existing technologies (e.g., weapon systems, improved engine performance, and weight reduction initiatives). Conducted design/development activities to integrate an Intelligence Broadcast Receiver (IBR) upgrade (obsolescence issue) to receive near real time intel data. Conducted System Requirement Review (SRR) and critical design review (CDR) for Directional Infrared Counter Measures (DIRCM) with Advanced Threat Warning (ATW) sensors upgrade. ***FY 2017 Plans:*** Conduct risk reduction and assessment of emerging and existing technologies. Continue design and development activities to integrate the IBR upgrade to receive near real time intel data. Conduct DIRCM w/ATW operational test and evaluation. ***FY 2018 Base Plans:*** Conduct risk reduction and assessment of emerging and existing technologies. Continue design and development activities to integrate the IBR upgrade. ***FY 2018 OCO Plans:*** N/A					
Title: Nacelle Improvements (Formerly Improved Inlet Solution (IIS))	10.596	14.520	16.971	0.000	16.971
Description: Nacelle Improvements (Formerly Improved Inlet Solution IIS): RDT&E funding provides for design, development, and testing of V-22 Nacelle Improvements. This major budget thrust was formerly met by the IIS program. During IIS development, it was realized there are other components in the V-22 nacelle that require readiness improvements and can benefit from the synergy of development simultaneous with IIS; including, but not limited to, the Infrared Suppressor (IRS), Generator Control Unit (GCU), nacelle wiring, heat exchanger, and the nacelle structure. The IIS major budget thrust scope has been expanded to encompass these broader					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force	Date: May 2017
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Nacelle Improvements for both the CV-22 and MV-22 fleets. These improvements will increase Engine Time on Wing (ETOW) and overall aircraft readiness/availability, reduce platform operating life cycle costs, and mitigate impacts to aircraft performance. Provides for modifications to the CV-22 nacelle and 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. Provides for new-construction, zero-time nacelles with structural improvements and vibration reductions. Provides a common configuration Generator Control Unit (GCU) that will be compatible with existing V-22 Variable Frequency Generator (VFG) and Constant Frequency Generator (CFG), support relocation of the GCU, support future generator capacity upgrades and be compatible with advanced prognostic diagnostic technology developed to control all 4 generators more efficiently; increasing V-22 reliability, maintainability and supportability for the fleet. Provides for Analysis of Alternatives, prototyping and demonstration of new Infrared Suppressor (IRS) candidate systems for the V-22. Provides for down-select to a new IRS design, Enginee... ***FY 2016 Accomplishments:*** IIS: Completed design and development. Redesigned Bypass Door Upper Inlet. Conducted post-CDR development activities. Conducted wind tunnel icing testing, developed hardware for test aircraft, and developed/delivered Joint Avionics Software Suite (JASS) software for DT&E. GCU: Conducted trade studies to determine optimal locations for relocated GCUs. Defined interfaces and created Interface Control Documents leveraging on RDT&E, Navy trade studies. IRS: Conducted Computational Fluid Dynamics modeling of nacelle airflow. Analyzed failure modes of incumbent IRS system. Conducted component redesign trade study. Sought and evaluated potential sources of new design IRS or improved current IRS. Leveraged findings of trade studies conducted and funded by RDT&E, Navy. ***FY 2017 Plans:***					

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force	Date: May 2017
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
IIS: Analyze results of icing wind tunnel testing, conduct Test Readiness Review (TRR), modify test aircraft, begin DT&E, and assess aircraft software changes. GCU: Conduct requirements analysis and Systems Requirements Review (SRR) leveraging RDT&E, Navy. IRS: Conduct prototype demonstration test flights, conduct Analysis of Alternatives, and down-select new IRS solution leveraging RDT&E, Navy. ***FY 2018 Base Plans:*** IIS: Complete DT&E, analyze DT&E results, correct deficiencies found during DT&E, begin OT&E. GCU: Begin EMD of GCU redesign/relocate. Competitively select redesigned GCU. IRS: Begin EMD of new IRS solution, begin OT&E planning. ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	26.821	28.702	22.519	0.000	22.519

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• RDT&E,DW: BA07: PE 1160403BB: *Special Operations, Aviation Systems*	0.000	15.590	14.259	0.000	14.259	21.635	27.961	8.000	0.000	0.000	90.438
• PDW: BA02: Line Item Special Ope...: *CV-22 Modification*	33.582	24.708	42.178	0.000	42.178	22.724	27.726	31.563	47.210	314.225	2,428.189
• APAF: BA04: Line Item #V022A0: *CV-22 (MYP)*	64.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4,318.234
• APAF: BA05: Line Item #V02200: *CV-22 Mods*	58.603	63.395	60.990	0.000	60.990	68.843	70.825	72.131	73.575	515.433	1,127.136
• APAF: BA07: Line Item # C0V220: *CV-22 Post-Production Support*	3.353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	20.284

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force	Date: May 2017
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• APAF: BA07: Line Item # V02200: *CV-22 (MYP)*	0.000	0.000	4.500	0.000	4.500	0.000	0.000	0.000	0.000	0.000	4.500
• RDT&E,N: BA05: PE 0604262N: *V-22A*	76.366	174.423	173.742	0.000	173.742	137.519	167.116	94.629	118.777	184.398	10,252.729

Remarks

In addition to the funding identified in the table above, prior year funding includes $520.411 in RDT&E, DW, BA07, PE 1160421BB: Special Operations, CV-22 Development, and $413.235M in RDT&E, AF, BA05, PE 0401318F: CV-22

E. Acquisition Strategy

The V-22 Joint Program Office (Naval Air Systems Command (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 of Beyond Line of Sight (BLOS) and Co-Site are scheduled to complete 30 Jun 2017.

--Nacelle Improvements (Formerly Improved Inlet Solution): 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. The FY2018 plan is to add incremental funding for IIS development to the existing contract. IRS and GCU will utilize some combination of sole source and competitive contracts. These improvements will be integrated, tested, and fielded as a single modification to minimize cost and impact on fleet operations.

--Enhanced Self-Deployment Capabilities: The Army Technology Applications Program Office at Ft Eustis awarded a FFP contract in June 2016 for LRU-1 Ethernet design (IBR). The FY2018 plan is to add incremental funding for LRU-1 Ethernet (IBR) design to the existing contract.

Development activities for the V-22 program to date have been primarily performed by the prime contractor, Bell-Boeing, 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.

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: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*	**Project (Number/Name)** 676033 / *CV-22 RDT&E POST PRODUCTION*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CV-22 Osprey Block 20 Development	SS/CPFF	Bell Boeing : Amarillo, TX	8.047	0.000		0.000		0.000		0.000		0.000	0.000	8.047	163.825
CV-22 Osprey Enhanced Self-deployment Capability	Various	Various : Various	16.186	14.516	Apr 2016	11.000	Jun 2017	3.460	Mar 2018	0.000		3.460	60.160	105.322	0.000
V-22 Osprey Nacelle Improvements (Formerly (IIS))	Various	Various : TBD	7.618	8.277	Mar 2016	14.520	Nov 2016	16.971	Dec 2017	0.000		16.971	24.466	71.852	69.990
		Subtotal	31.851	22.793		25.520		20.431		0.000		20.431	84.626	185.221	233.815

Remarks

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

Nacelle Improvements (formerly 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.

Prior Years funding ($322.656M) was executed in PE 0401318F, BA05.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CV-22 Osprey Engineering Technical Support	Various	Various : Various	1.717	1.047	Dec 2015	1.835	Mar 2017	1.000	Mar 2018	0.000		1.000	9.721	15.320	0.000
		Subtotal	1.717	1.047		1.835		1.000		0.000		1.000	9.721	15.320	0.000

Remarks

Prior Years Funding $40.454M was executed in PE 0401318F (BA05).

Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force			Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*	**Project (Number/Name)** 676033 / *CV-22 RDT&E POST PRODUCTION*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CV-22 Osprey Test & Evaluation Technical Support	Various	Various : Various	3.913	2.781	Mar 2016	1.115	Jan 2017	0.900	Dec 2016	0.000		0.900	7.323	16.032	0.000
		Subtotal	3.913	2.781		1.115		0.900		0.000		0.900	7.323	16.032	0.000

Remarks

Prior Years Funding $46.764M was executed in PE 0401318F (BA05).

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2016 Cost	FY 2016 Award Date	FY 2017 Cost	FY 2017 Award Date	FY 2018 Base Cost	FY 2018 Base Award Date	FY 2018 OCO Cost	FY 2018 OCO Award Date	FY 2018 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CV-22 Osprey PMA/Travel	Allot	AFLCMC/WIV : Patuxent River, MD	0.217	0.200	Nov 2015	0.232	Nov 2016	0.188	Nov 2017	0.000		0.188	1.896	2.733	-
		Subtotal	0.217	0.200		0.232		0.188		0.000		0.188	1.896	2.733	-

Remarks

Prior Years Funding $3.361M was executed in PE 0401318F (BA05).

	Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	37.698	26.821		28.702		22.519		0.000		22.519	103.566	219.306	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*	**Project (Number/Name)** 676033 / *CV-22 RDT&E POST PRODUCTION*

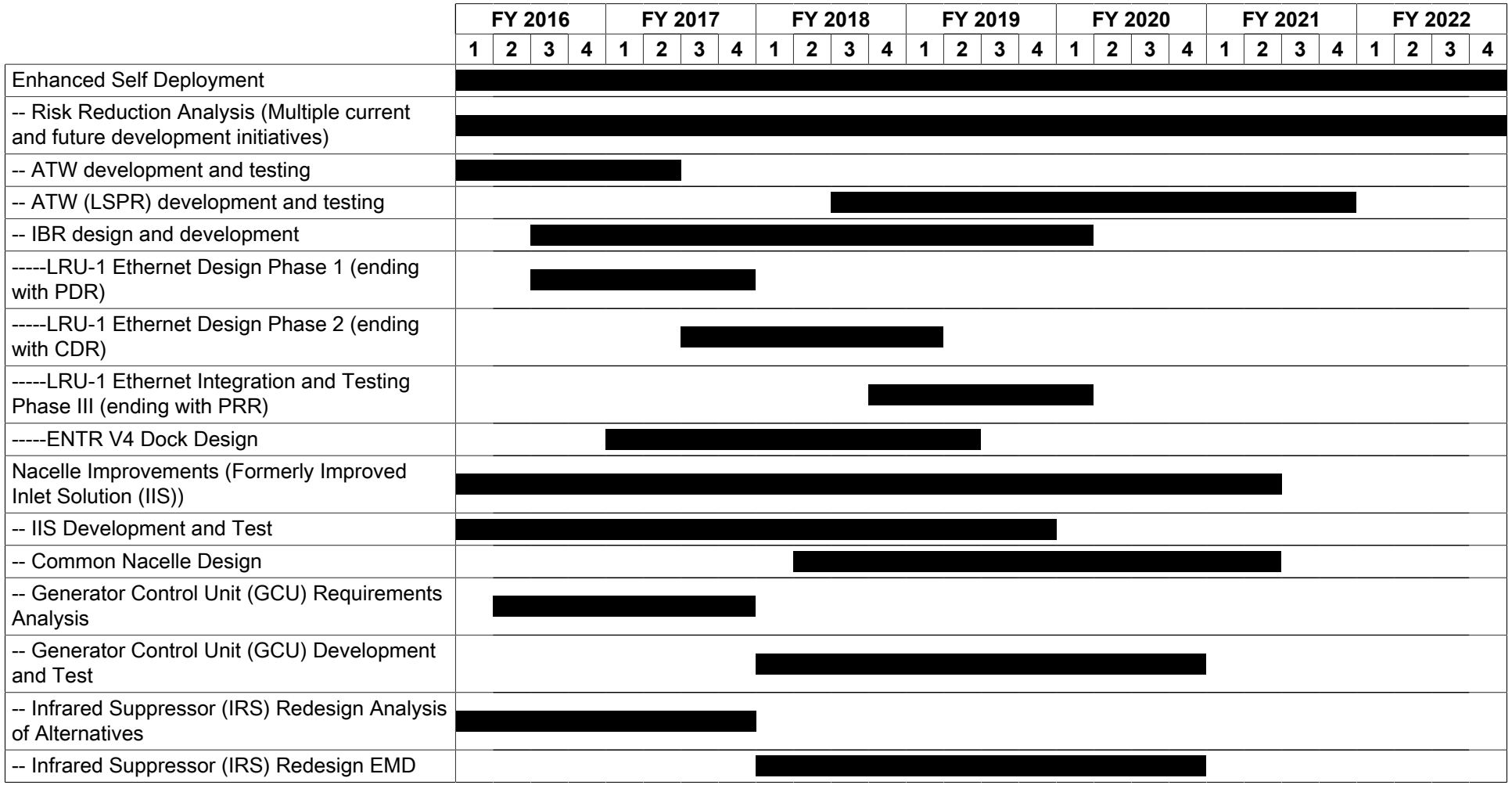

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0401318F / *CV-22*	**Project (Number/Name)** 676033 / *CV-22 RDT&E POST PRODUCTION*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Enhanced Self Deployment	1	2016	4	2022
-- Risk Reduction Analysis (Multiple current and future development initiatives)	1	2016	4	2022
-- ATW development and testing	1	2016	2	2017
-- ATW (LSPR) development and testing	3	2018	4	2021
-- IBR design and development	3	2016	1	2020
-----LRU-1 Ethernet Design Phase 1 (ending with PDR)	3	2016	4	2017
-----LRU-1 Ethernet Design Phase 2 (ending with CDR)	3	2017	1	2019
-----LRU-1 Ethernet Integration and Testing Phase III (ending with PRR)	4	2018	1	2020
-----ENTR V4 Dock Design	1	2017	2	2019
Nacelle Improvements (Formerly Improved Inlet Solution (IIS))	1	2016	2	2021
-- IIS Development and Test	1	2016	4	2019
-- Common Nacelle Design	2	2018	2	2021
-- Generator Control Unit (GCU) Requirements Analysis	2	2016	4	2017
-- Generator Control Unit (GCU) Development and Test	1	2018	4	2020
-- Infrared Suppressor (IRS) Redesign Analysis of Alternatives	1	2016	4	2017
-- Infrared Suppressor (IRS) Redesign EMD	1	2018	4	2020