Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force											Date: February 2018	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 1206423F / *Global Positioning System III - Operational Control Segment*							
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	3,267.825	376.645	510.938	513.235	0.000	513.235	402.102	411.240	432.736	274.666	46.113	6,235.500
67A021: *OCX*	2,922.750	316.931	447.382	449.342	0.000	449.342	337.142	344.435	367.816	208.564	46.113	5,440.475
67A025: *GPS Enterprise Integrator*	345.075	59.714	63.556	63.893	0.000	63.893	64.960	66.805	64.920	66.102	0.000	795.025
Program MDAP/MAIS Code: 456												

Note

Prior Year funds were budgeted in Program Element (PE) 0603423F.

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space based positioning, navigation and timing distribution system which operates through all weather. GPS supports both civil and military users in air, space, sea and land operations. GPS is a satellite-based radio navigation system that serves military and civil users worldwide. GPS users process satellite signals to determine accurate position, velocity and time. GPS must comply with 10 United States Code (USC) sec 2281 which requires that the Secretary of Defense (SECDEF) ensures the continued sustainment and operation of GPS for military and civilian purposes, and 51 USC sec 50112, which requires that GPS complies with certain standards and facilitates international cooperation.

PE 1206423F funds Research, Development, Test and Evaluation (RDT&E) for the GPS Next Generation Operational Control System (OCX) and the GPS Enterprise Integrator (EI). This includes advanced concept development such as support for Regional Military Protection (RMP), systems analysis, modernized control segment development, modernization/deployment of 17 monitoring stations, mission planning development, training simulators, integrated logistics support products, test resources, systems engineering required to meet the Government's obligations to the international, military and civil communities, and system requirements verification. OCX acquisition was established to 1) provide command and control of legacy and GPS III satellites, 2) incorporate situational awareness to support Navigation Warfare (NAVWAR) and signal monitoring, 3) enable mission capability upgrades to support a warfighter effects-based approach to operations, and 4) integrate Department of Defense (DoD) information assurance and cybersecurity controls and capabilities. GPS EI is responsible for architecture and system definition (the analysis and definition, management, maintenance, and evolution of the GPS Enterprise requirements and interface technical documents) as well as for the planning, execution, and fielding of the GPS Enterprise.

OCX funds will support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, modernization initiatives, systems engineering, system development, resolving obsolescence issues, test and evaluation efforts, and mission operations. These activities support upgrades and product improvements for military and civil applications necessary to enable efforts to protect U.S. Military and Allies' use of GPS. Additionally, funds will ensure OCX efforts meet current and future Joint Requirements Oversight Council (JROC) approved required capabilities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force	Date: February 2018
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*

The GPS Enterprise consists of Space, Ground Control, Nuclear Detonation (NUDET) Detection System (NDS) and User Equipment Segments. The Government is responsible for the integration of the GPS Segments such that they provide worldwide GPS capability to support the warfighter and over a billion national security, civil, Allied, and commercial GPS users.

The GPS EI project includes the efforts associated with the Government's prime contract tasks necessary to accomplish this critical integrating function with the entire GPS user community. The GPS EI maintains the GPS current architecture and system definition, controls and validates interfaces, ensures compatibility of Generation II and III systems, and develops/manages plans for execution and fielding of the GPS Enterprise. Further, GPS EI provides modeling, simulation, and technical analyses of impacts for Government-directed enterprise-level trades among the GPS segments leading to definition, management, maintenance, and evolution of the GPS Enterprise requirements and interface technical documents to build and ensure the integrity of the enterprise technical baseline, and perform system requirements verification.

In addition, the GPS EI project funds the technical evolution, risk reduction, enterprise-level testing and delivery of all GPS Enterprise capabilities. Examples for Generation II include electronic protection and additional civil signals; for Generation III, additional anti-jamming protection. To accomplish this, GPS EI delivers Test and Verification capabilities, Requirements and Interface Management, and Systems Integration support across the Space, Control, and User Segments. In this capacity, GPS EI is responsible for managing this cross-program work to provide these and other capabilities.

GPS EI's analyses guides Government decisions to ensure efficient and effective synchronization and execution across all Generation II and III GPS programs. For Enterprise-wide integration to be successful, the GPS EI: works with the GPS and NDS prime contractor teams to develop plans for early risk reduction System Integration Demonstrations to ensure system interfaces and functionality meet user and system requirements; ensures all equipment and documentation is ready when needed; integrates and analyzes enterprise schedules; and conducts formal test and verification, including Requirement Verification Plans and System Test Plans and Procedures. GPS EI performs all these efforts across all GPS programs in all acquisition phases. The Government owns the GPS Enterprise system requirements and integration, and highly leverages the GPS EI team to eliminate the need to fund a development prime contractor to perform these functions. This enhances Government control, oversight and program accountability.

The current and future space domain demands that space systems be responsive to new and changing threats, and can rapidly integrate new capabilities to make our warfighting force more resilient in a contested battlespace. This agility, survivability, and rapid reconstitution must extend through the entire space warfighting enterprise, to include how we learn about the threat; develop solutions; acquire, test, deploy, train, operate and integrate new systems into the greater system of systems; and ensure our space mission force is ready to defeat a thinking adversary in a complex, multi-domain battlespace. The enterprise will use all of its elements to accelerate decision-making, prototype potential solutions, rapidly integrate decision-making tools and sustain a war-winning capability by delivering multi-domain effects in, from, and through space and cyberspace enabling battle management and resilience options to "fight through."

This PE may include necessary civilian pay expenses required to manage, execute, and deliver GPS III Operational Control Segment (OCS) weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force	Date: February 2018
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*

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

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	513.268	510.938	441.609	0.000	441.609
Current President's Budget	376.645	510.938	513.235	0.000	513.235
Total Adjustments	-136.623	0.000	71.626	0.000	71.626
• Congressional General Reductions	-2.906	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	-13.717	0.000			
• Other Adjustments	-120.000	0.000	71.626	0.000	71.626

Change Summary Explanation

FY2017: -$120.000M FY17 Request for Additional Appropriations (RAA)
FY2019: -$ 3.860M Inflation
FY2019: +$75.486M Fund OCX to Service Cost Position

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1206423F / *Global Positioning System III - Operational Control Segment*	Project (Number/Name) 67A021 / *OCX*	

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
67A021: *OCX*	2,922.750	316.931	447.382	449.342	0.000	449.342	337.142	344.435	367.816	208.564	46.113	5,440.475
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space based positioning, navigation and timing distribution system which operates through all weather. This project funds the research and development for the GPS Next Generation Operational Control System (OCX). This includes, but is not limited to, advanced concept development, systems engineering and analysis, modernized control segment and mission planning development, modernization/deployment of 17 monitoring stations, training simulators, integrated logistics support products, and test resources.

OCX acquisition was established to: 1) provide command and control of legacy and GPS III satellites; 2) incorporate situational awareness to support Navigation Warfare (NAVWAR) and signal monitoring; 3) enable mission capability upgrades to support a warfighter effects-based approach to operations; and 4) integrate DoD information assurance and cybersecurity controls and capabilities. OCX funds will support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, technology development, systems engineering, system development, test and evaluation efforts and mission operations in support of upgrades and product improvements for military and civil applications necessary to support efforts to protect U.S. military and Allies' use of GPS. Additionally, funds will ensure efforts to meet current and future Joint Requirements Oversight Council (JROC) approved required capabilities.

Funding will also support new capabilities being developed by the GPS III Follow-on production program along with Regional Military Protection (RMP). This effort will research potential impacts and develop solutions due to the GPS III Follow-On modifications, upgrade monitoring stations, and implement advances in collection and integration of RMP high-power regional Military-Code (M-Code) signals.

OCX Block 0 (through Iteration 1.5) is the Launch and Control System (LCS) intended to conduct Launch and Early Orbit (LEO) operations and the on-orbit checkout of all GPS III satellites. OCX Block 0 is a subset of OCX Block 1.

OCX Block 1 (adds Iterations 1.6, 1.7 and 2.1 to Block 0) fields the operational capability to control all legacy satellites and civil signals (L1C/A), military signals (L1P(Y), L2P(Y)) as well as the GPS III satellites and the modernized civil signal (L2C) and the aviation safety-of-flight signal (L5). In addition, Block 1 will field the basic operational capability to control the modernized military signals (L1M and L2M M-Code), and the globally compatible signal (L1C). It also fully meets information assurance/cyber defense requirements.

OCX Block 2 fields the advanced operational capability to control the advanced features of the modernized military signals (L1M and L2M M-Code). Blocks 1 & 2 are being delivered concurrently as a result of the Nunn-McCurdy review.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: OCX Development	287.150	410.251	423.727

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: Development of GPS OCX system to launch GPS III, operate a mixed GPS II and GPS III constellation, and provide for a robust Information Assurance system. ***FY 2018 Plans:*** Continue Iteration 1.7 and 2.1 software development and integration activities. Continue system simulator accreditation process. Continue installation and integration of the monitoring stations equipment and OCX Monitor Station Receiver Element (OMSRE). Continue testing and integration activities for Iteration 1.6. Continue security certification activities leading to Authority To Operate (ATO). Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc. ***FY 2019 Plans:*** Continue contractor support of Block 0. Complete Iteration 1.7 and 2.1 software development and continue integration activities. Complete 1.7 and 2.1 Security Test and Evaluation activities. Complete installation and integration of the monitoring stations equipment and OMSRE. Begin OMSRE Positioning Signal Integrity Continuity Assurance (PSICA) data collecting and Network Interface Module (NIM) tuning. Continue security certification leading to ATO. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $13.476M. Justification for this increase is described in plans above.			
Title: Technical Support ***Description:*** Development of the Standardized Space Trainer (SST) to provide GPS III operator training. Development of Enterprise Mission Planning Systems. Facilities upgrades for Control Stations and associated equipment and servers. Systems Engineering (SE) including Technical Mission Analysis, Modernization SE and Technical Support, and Test and Evaluation. ***FY 2018 Plans:*** Continue work on the SST and develop demonstration capabilities; continue development of Enterprise Mission Planning Systems. Continue work on the facility upgrades to include the Mission Control Station (MCS), Alternate Mission Control Station (AMCS), and remote monitor station sites. ***FY 2019 Plans:*** Complete work on the SST and development demonstration of capabilities. Complete installation and integration. Continue data collection, and tuning of the monitoring stations equipment and OMSRE. Complete facility upgrades and testing to include the	29.781	37.131	25.615

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
MCS, AMCS, and remote monitor station sites. These activities may include, but are not limited to studies, technical analysis, prototyping, etc. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 decreased compared to FY 2018 by $11.516M. Justification for this decrease is described in plans above.			
Accomplishments/Planned Programs Subtotals	316.931	447.382	449.342

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
• RDTE 07 PE 1203265F: *GPS III Space Segment*	165.794	243.435	144.543	-	144.543	42.440	10.780	7.296	8.893	12.008	635.189
• RDTE 05 PE 1203269F: *GPS III Follow-On*	-	-	451.889	-	451.889	474.235	435.063	371.441	306.158	1,193.184	3,231.970
• SPAF 01 Line Item GPSIII: *GPS III Space Segment*	33.974	85.894	69.386	-	69.386	773.398	782.838	1,152.975	1,152.796	4,185.159	8,236.420
• DOT: *DOT (FAA) Civil Funding*	13.300	11.400	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	24.700

Remarks

D. Acquisition Strategy

The Air Force is pursuing a "Block" approach for OCX in order to respond to warfighter capability requirements. The strategy calls for capability (e.g., better signal maintainability, Unified S-Band (USB), Search and Rescue (SAR) GPS, and near-real time Command and control (C2)) on-ramps for the follow-on contract for GPS III Space Vehicles (SVs) (starting no earlier than SV11) which will require updates to the OCX ground segment. Enterprise studies will ensure GPS Enterprise synchronization across space and ground segments.

E. 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 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*	

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
GPS OCX Phase B OCX Block 1 & 2 Development	C/CPAF	Raytheon : Aurora, CO	2,243.680	269.588	Dec 2016	382.642	Dec 2017	395.823	Dec 2018	-		395.823	1,132.478	4,424.211	3,621.000
GPS OCX Technical Mission Analysis	MIPR	Various : Various	15.103	16.511	Dec 2016	16.860	Dec 2017	17.365	Dec 2018	-		17.365	52.574	118.413	118.413
GPS OCX Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	49.440	4.063	Dec 2016	3.029	Dec 2017	3.029	Dec 2018	-		3.029	12.087	71.648	71.648
GPS OCX Modernization/ SE & Technical Support	Various	Various : Various	61.852	1.070	Dec 2016	0.450	Dec 2017	0.050	Dec 2018	-		0.050	22.435	85.857	-
GPS OCX AMCS Facility Dev	Various	Various : Various	0.373	0.400	Mar 2017	0.000	Mar 2018	-		-		-	0.000	0.773	-
GPS OCX Standard Space Trainer (SST)	C/CPAF	Sonalyst, Inc : Waterford, CT	16.500	2.500	Dec 2016	5.000	Dec 2017	5.000	Dec 2018	-		5.000	10.000	39.000	39.000
GPS OCX Enterprise Mission Planning	C/CPIF	Booz Allen Hamilton Eng Services : El Segundo, CA	10.000	6.300	Jan 2017	5.800	Jan 2018	3.200	Jan 2019	-		3.200	0.500	25.800	25.800
GPS OCX Phase A Development	Various	Various : Various	289.000	-		-		-		-		-	0.000	289.000	289.000
		Subtotal	2,685.948	300.432		413.781		424.467		-		424.467	1,230.074	5,054.702	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
GPS OCX T&E	C/CPAF	Various : Various	1.682	3.000	Mar 2017	9.021	Mar 2018	-		-		-	0.000	13.703	-
		Subtotal	1.682	3.000		9.021		-		-		-	0.000	13.703	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
GPS OCX FFRDC	MIPR	Various : Various	126.887	6.615	Oct 2016	7.773	Oct 2017	7.252	Oct 2018	-		7.252	24.563	173.090	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*

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
GPS OCX A&AS	Various	Various : Various	106.395	6.024	Feb 2017	16.357	Feb 2018	17.163	Feb 2019	-		17.163	47.463	193.402	-
GPS OCX Other Support	Various	Various : Various	1.838	0.860	Oct 2016	0.450	Oct 2017	0.460	Oct 2018	-		0.460	1.970	5.578	-
		Subtotal	235.120	13.499		24.580		24.875		-		24.875	73.996	372.070	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	2,922.750	316.931		447.382		449.342		-		449.342	1,304.070	5,440.475	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*

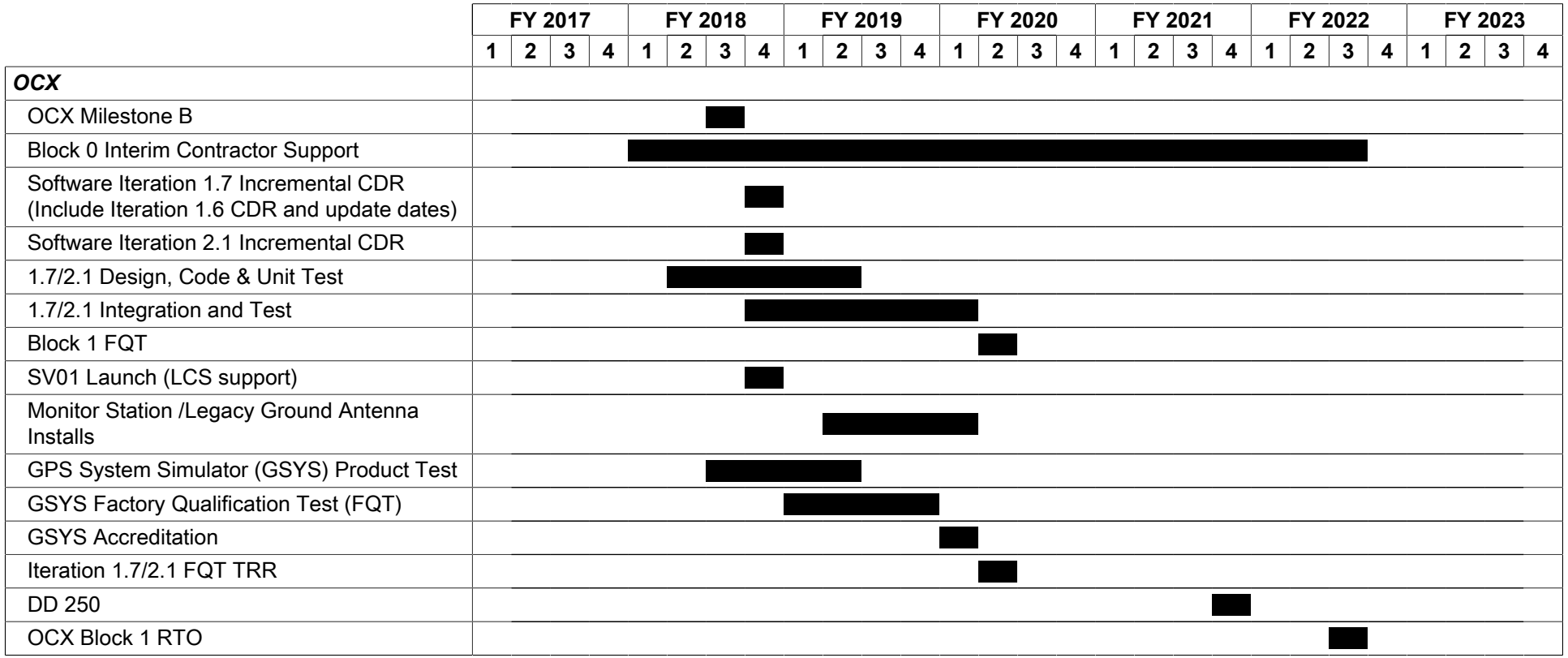

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
OCX				
OCX Milestone B	3	2018	3	2018
Block 0 Interim Contractor Support	1	2018	3	2022
Software Iteration 1.7 Incremental CDR (Include Iteration 1.6 CDR and update dates)	4	2018	4	2018
Software Iteration 2.1 Incremental CDR	4	2018	4	2018
1.7/2.1 Design, Code & Unit Test	2	2018	2	2019
1.7/2.1 Integration and Test	4	2018	1	2020
Block 1 FQT	2	2020	2	2020
SV01 Launch (LCS support)	4	2018	4	2018
Monitor Station /Legacy Ground Antenna Installs	2	2019	1	2020
GPS System Simulator (GSYS) Product Test	3	2018	2	2019
GSYS Factory Qualification Test (FQT)	1	2019	4	2019
GSYS Accreditation	1	2020	1	2020
Iteration 1.7/2.1 FQT TRR	2	2020	2	2020
DD 250	4	2021	4	2021
OCX Block 1 RTO	3	2022	3	2022

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force			Date: February 2018
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 1206423F / *Global Positioning System III - Operational Control Segment*	Project (Number/Name) 67A025 / *GPS Enterprise Integrator*	

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
67A025: *GPS Enterprise Integrator*	345.075	59.714	63.556	63.893	0.000	63.893	64.960	66.805	64.920	66.102	0.000	795.025
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) Enterprise Integrator (EI) is responsible for integrating, synchronizing, testing and verifying the three ACAT I Defense Acquisition Programs that constitute the GPS Enterprise. Moreover, GPS EI is responsible for delivering reliable Positioning, Navigation, and Timing (PNT) signal capability to military operators, the civil user community, and international partners. Similarly, the Government Joint Program Office owns and approves the technical baseline and is responsible for the successful fielding of all the GPS Segments (space, control, and user). In order to successfully execute its responsibilities, the Government relies on GPS EI's specific expertise to create an enterprise architecture, integrate segment products, and verify the enterprise requirements are adequately met.

The GPS EI is also responsible for developing and managing the Enterprise technical baseline, which reflects multiple stakeholders' requirements. Such stakeholders include the Department of Defense (DoD), foreign governments, industry, and the general public (through four Interface specifications). Furthermore, GPS EI ensures GPS capabilities meet the warfighter's, civil agencies', commercial entities', international treaties', and over four billion global GPS users' needs. The GPS EI also manages the process through which the JROC validated requirements are matured and flowed down to the system segments, while remaining consistent with various interfaces. This enables the GPS system to meet Title 10 of the U.S. Code, Section 2281, mandated GPS capabilities and various other obligations to the international community that provide inter-operable PNT signals. GPS EI is also responsible for all aspects of schedule and technical alignment across the segments. Additionally, GPS EI is responsible for creating and managing plans that provide early exercise of the products under development, compatibility analysis, and inter-segment testing, which result in risk reduction. The inter-segment tests are required to prove GPS Next Generation Operational Control System's (OCX) interoperability with GPS III satellites, and modernized user equipment. More importantly, it ensures backwards compatibility with GPS Block II satellites and legacy user equipment.

GPS EI activity supports the Government Joint Program Office's GPS spectrum protection at international forums such as the International Telecommunications Union. Such support consists of advocating on behalf of the United States Government when negotiating with foreign partners. In addition, GPS EI provides technical expertise to maintain relationships with other U.S. government agencies that include the Federal Aviation Administration (FAA), National Geospatial-Intelligence Agency (NGA), National Aeronautics and Space Administration (NASA), Departments of State (DOS), Transportation, Homeland Security, and Commerce.

Spectrum expertise also ensures GPS priority over eight essential spectrum signals required for civil air navigation such as the safety of life signal and L5. Spectrum Protection prevents encroachment from commercial or foreign entities, which results in the preservation of warfighter's reliable signal. As a result, military operations and the integrity of the global economic infrastructure are protected. GPS EI is also the GPS enterprise expert on Cybersecurity, System Safety, and System Security, which ultimately ensures a protected GPS Signal for both the military and civil users. GPS EI is accountable for the development, execution, and analysis of OCX, cybersecurity and associated test cases necessary to deliver a secure operational system.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

GPS EI supports the Government development and implementation of various Systems Engineering documents, defines the methods of verification, conducts the analyses or tests, and assists the government in leading Integrated System Tests. In addition, GPS EI validates the system performance in various mission threat scenarios during its development. GPS EI provides in-depth technical expertise to enhance government control, oversight and program accountability.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: GPS Enterprise Integrator	59.714	63.556	63.893
Description: The integration and technical baseline control of all elements of the GPS system (space/control/user) with one another in support of both military and civil users. Execute four major integration exercises, multiple mini-events, and five rehearsals between space and ground leading up to the launch of GPS III space vehicle (SV) 01. ***FY 2018 Plans:*** Support the Military Global Positioning System User Equipment (MGUE) operational test planning. Continued execution of MGUE Developmental Testing (DT) (Phases 2-4). Support launch of SV01. Selective Availability Anti-Spoofing Module (SAASM) Mission Planning System (SMPS) 5.B.3 testing will execute and complete. Plan and conduct test events for SV02. Cybersecurity testing for MGUE and SMPS will continue. Continue developing Military-Code (M-Code) monitoring for Early Use integration and Command and Control of M-Code on the existing Operational Control System (OCS) Architecture Evolution Plan (AEP). Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc. ***FY 2019 Plans:*** Continue test planning for IST 3-1 (OCX Block 1 and GPS III) and IST 3-2 (OCX Block 1, satellite constellation, and MGUE). Support OCX Block 1 product test. Execute MGUE lead platform tests. Continue to support MGUE operational test planning. Continue execution of MGUE DT (IST 3-3 Phases 2-4). Continue to conduct test events for SV-05 and SV-06. Support launch of SVs -03, -04, and -05. Support integration efforts for M-Code Early Use (MCEU) milestone C. Test and integrate Contingency Operations (COps) into AEP as version 8.0. Support AEP ground antennas and Commercial over-the-counter (COTS) upgrades. Test and integrate M-Code monitoring stations upgrades. Continue cybersecurity tests across all GPS segments (space/control/ user). Continue tests and integration of M-Code monitoring for Early Use integration and Command and Control of M-Code on AEP. Continue tests, and analysis to protect GPS users from interference sources that threaten performance of GPS receivers. Participate in international Global Navigation Satellite System forums to advocate for GPS regulatory and technical interests. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increased compared to FY 2018 by $0.337M. Justification for this increase is described in plans above.			
Accomplishments/Planned Programs Subtotals	59.714	63.556	63.893

Exhibit R-2A, RDT&E Project Justification: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

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
• RDTE 04 PE 1203164F: *NAVSTAR Global Positioning System (User Equipment) (Space)*	297.975	253.939	286.629	-	286.629	240.748	155.139	82.178	71.686	90.965	1,479.259
• RDTE 07 PE 1203265F: *GPS III Space Segment*	165.794	243.435	144.543	-	144.543	42.440	10.780	7.296	8.893	12.008	635.189
• RDTE 05 PE 1203269F: *GPS III Follow-On*	-	-	451.889	-	451.889	474.235	435.063	371.441	306.158	1,193.184	3,231.970
• RDTE 07 PE 1203913F: *NUDET Detection System*	21.093	31.508	19.778	-	19.778	16.972	14.162	14.456	14.719	Continuing	Continuing
• SPAF 01 Line Item MGPS00: *Global Positioning System (Space*	13.171	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	13.171
• SPAF 01 Line Item GPSIII: *GPS III Space Segment*	33.974	85.894	69.386	-	69.386	773.398	782.838	1,152.975	1,152.796	4,185.159	8,236.420

Remarks

D. Acquisition Strategy

In accordance with a "back to basics" acquisition approach and exercise of strong oversight of development contractors, the Air Force is required to exercise complete ownership of the architecture, system definition, technical baseline, and integration of the GPS space, ground, and user segments. While this complex inter-segment integration is traditionally performed by a prime contractor under a systems development contract, for GPS, this approach requires the government to be the integrator. To execute this responsibility, the government leverages systems engineering and integration expertise from both Federally Funded Research and Development Center (FFRDC) contractors and a Systems Engineering & Integration (SE&I) contractor. The GPS EI function of the SE&I contractor is currently funded within this PE. The SE&I effort was originally procured in 2007 through a full and open competition, as was the new follow-on SE&I contract awarded in 2015. The SE&I follow-on strategy builds in year over year cost reductions as requirements stabilize.

E. 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 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

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
GPS EI Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	174.427	20.038	Jun 2017	22.168	Oct 2017	22.383	Oct 2018	-		22.383	81.219	320.235	320.235
GPS EI Technical Mission Analysis 1	MIPR	Aerospace : El Segundo, CA	73.355	10.200	Jun 2017	11.536	Oct 2017	11.882	Oct 2018	-		11.882	51.045	158.018	158.018
GPS EI Technical Mission Analysis 2	RO	MITRE : Various	70.284	9.935	Jun 2017	10.440	Oct 2017	10.754	Oct 2018	-		10.754	46.926	148.339	148.339
GPS EI MRTA/MSTA	C/CPIF	Draper Labs : Cambridge, MA	4.025	3.421	May 2017	3.400	Dec 2017	3.400	Dec 2018	-		3.400	13.600	27.846	27.846
GPS EI Enterprise Mission Planning	C/CPIF	Various : El Segundo, CA	1.320	-		-		-		-		-	0.000	1.320	1.320
GPS EI Cybersecurity	Various	Various : El Segundo, CA	8.818	7.418	May 2017	8.863	Oct 2017	7.820	Oct 2018	-		7.820	38.200	71.119	71.119
GPS EI Additonal Product Development	Various	Various : Various	2.831	1.251	Jul 2017	1.378	Oct 2017	2.074	Oct 2018	-		2.074	9.296	16.830	-
		Subtotal	335.060	52.263		57.785		58.313		-		58.313	240.286	743.707	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
EI Integrated Systems Test	Various	Various : El Segundo, CA	0.294	0.000		1.200	Apr 2018	1.350	Apr 2019	-		1.350	4.320	7.164	-
		Subtotal	0.294	0.000		1.200		1.350		-		1.350	4.320	7.164	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
GPS EI FFRDC	Various	Various : El Segundo, CA	0.178	0.405	Jun 2017	0.614	Oct 2017	0.470	Oct 2018	-		0.470	1.794	3.461	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

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
GPS EI A&AS	Various	Various : El Segundo, CA	8.710	6.772	Jul 2017	3.647	Oct 2017	3.560	Oct 2018	-		3.560	15.587	38.276	-
GPS EI Other Support	Various	Various : Various	0.833	0.274	Oct 2016	0.310	Oct 2017	0.200	Oct 2018	-		0.200	0.800	2.417	-
		Subtotal	9.721	7.451		4.571		4.230		-		4.230	18.181	44.154	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	345.075	59.714		63.556		63.893		-		63.893	262.787	795.025	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

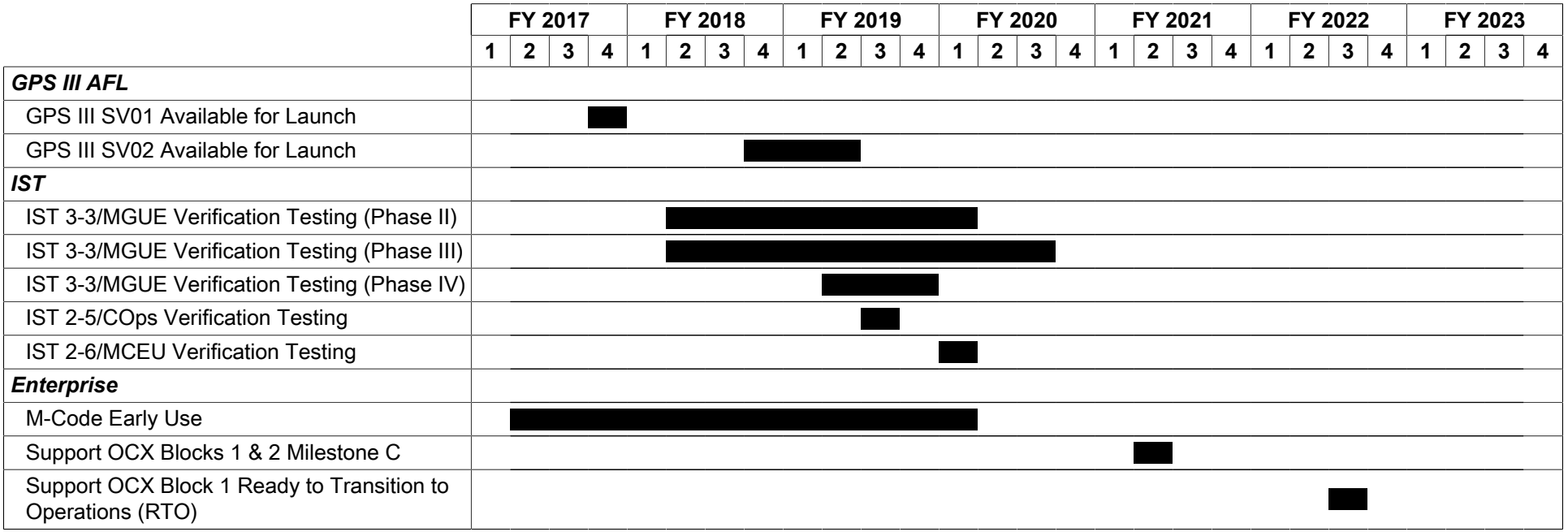

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force		Date: February 2018
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
GPS III AFL				
GPS III SV01 Available for Launch	4	2017	4	2017
GPS III SV02 Available for Launch	4	2018	2	2019
IST				
IST 3-3/MGUE Verification Testing (Phase II)	2	2018	1	2020
IST 3-3/MGUE Verification Testing (Phase III)	2	2018	3	2020
IST 3-3/MGUE Verification Testing (Phase IV)	2	2019	4	2019
IST 2-5/COps Verification Testing	3	2019	3	2019
IST 2-6/MCEU Verification Testing	1	2020	1	2020
Enterprise				
M-Code Early Use	2	2017	1	2020
Support OCX Blocks 1 & 2 Milestone C	2	2021	2	2021
Support OCX Block 1 Ready to Transition to Operations (RTO)	3	2022	3	2022