Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force												Date: February 2020
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 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	4,013.817	491.601	445.302	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4,950.720
67A021: *OCX*	3,552.479	433.904	380.342	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4,366.725
67A025: *GPS Enterprise Integrator*	461.338	57.697	64.960	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	583.995
Program MDAP/MAIS Code: 456												

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206423F, Global Positioning System III - Operational Control Segment efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206423SF Global Positioning System III - Operational Control Segment from Appropriation 3600, Budget Activity 07 due to the creation of a new Appropriation for Space Force.

The Global Positioning System (GPS) is a space based Positioning, Navigation and Timing (PNT) 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 Title 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.

Program Element (PE) 1206423F funds Research, Development, Test and Evaluation (RDT&E) for the GPS Next Generation Operational Control System (OCX), the upgrade to OCX called OCX Block 3F to incorporate Regional Military Protection (RMP), command and control functionality for GPS III Follow-on (GPS IIIF) satellites, and the GPS Enterprise Integrator (EI). 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. OCX Block 3F will upgrade OCX with new capabilities to synchronize with GPS IIIF Space Segment 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 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 United States (U.S.) Military and Allies' use of GPS. Additionally, funds ensure OCX efforts meet current and future Joint Requirements Oversight Council (JROC) approved required capabilities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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*

OCX Block 3F will upgrade OCX with new capabilities to synchronize with GPS IIIF Space Segment and Military GPS User Equipment (MGUE) Increment 2 capabilities. This includes advanced concept development such as 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 Block 3F will maintain backward compatibility and support the legacy constellation develop solutions necessary to command, control and monitor GPS IIIF, to include advance collection and integration of RMP high power regional M-code signals, rapid warfighter effects and support to GPS auxiliary payloads.

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 critical integration functions with the three GPS enterprise material segments along with the logistics, operational and transition communities. 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; for Generation III, additional anti-jamming protection and additional civil signals. 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 guide 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.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force	Date: February 2020
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*

authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This PE may include necessary civilian pay expenses required to manage, execute, and deliver OCX weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

This program is in Budget Activity 7, Operational System 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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	509.258	445.302	487.440	0.000	487.440
Current President's Budget	491.601	445.302	0.000	0.000	0.000
Total Adjustments	-17.657	0.000	-487.440	0.000	-487.440
• 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	-17.657	0.000			
• Other Adjustments	0.000	0.000	-487.440	0.000	-487.440

Change Summary Explanation

FY 2021: -$487.440M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
67A021: *OCX*	3,552.479	433.904	380.342	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4,366.725
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

GPS is a space-based PNT distribution system which operates through all weather. This project funds the research and development for 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 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 Allied use of GPS. Additionally, funds will ensure efforts to meet current and future JROC approved required capabilities.

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 Oct 2016 Nunn-McCurdy review.

OCX Block 3F will modify OCX Blocks 1 and 2 to field new capabilities in support of the GPS III Follow-On (GPS IIIF) production program and incorporate Regional Military Protection (RMP) to handle future threats. OCX Block 3F will upgrade OCX with new capabilities to synchronizes with GPS IIIF Space Segment and Military GPS User Equipment (MGUE) Increment 2 capabilities. OCX Block 3F will maintain backward compatibility with the existing capabilities to support the legacy GPS constellation and integrate into Block 1 and 2 and future efforts to support GPS IIIF. The OCX Block 3F effort will develop solutions necessary to command, control, and monitor GPS IIIF spacecraft and include advance collection and integration of RMP high-power regional Military Code (M-Code) signals, rapid warfighter effects, and support to GPS IIIF auxiliary payloads (including Search and Rescue (SAR), Nuclear Detonation (NUDET) Detection System (NDS)).

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 2019	FY 2020	FY 2021
Title: OCX Development ***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 2020 Plans:*** Continue Iteration 1.7 and 2.1 integration and test activities. Continue contractor support of the Block 0 baseline that is supporting GPS III satellite launch and checkout. Complete system level Factory Qualification Testing (FQT) and Site Acceptance Testing (SAT). Continue system maturity demonstrations, known as Transition Risk Reduction Operations (TRROs), in support of transition from the legacy Operational Control Segment (OCS) to OCX. Complete OCX Monitor Station Receiver Equipment (OMSRE) Positioning Signal Integrity Continuity Assurance (PSICA) data collecting and Network Interface Module (NIM) tuning. Submit Authorization to Operate (ATO) packages for the Block 0 and Operational Block 1. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. This includes OCX Block 3F design and impact assessments associated with supporting new capabilities under development by GPS IIIF production program. Begin software and hardware obsolescence remediation and replacement of obsolete IBM servers. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc. ***FY 2021 Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A	401.474	342.142	0.000
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 (TMA), Modernization SE and Technical Support, and Test and Evaluation (T&E). ***FY 2020 Plans:*** Continue 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 Master Control Station (MCS), Alternate MCS (AMCS), and remote monitor station sites. ***FY 2021 Plans:***	32.430	38.200	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 2019	FY 2020	FY 2021
N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	433.904	380.342	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTE 07 PE 1203265F: *GPS III Space Segment*	139.180	42.440	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	181.620
• SPAF 01 GPSIII: *GPS III Space Segment*	69.386	31.466	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	100.852
• RDTE 05 PE 1203269F: *GPS III Follow-On*	412.202	447.875	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	860.077
• SPAF 01 GPS03C: *GPSIII Follow On*	0.000	394.625	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	394.625

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. Acquisition strategy for OCX Block 3F is currently in work. However, the program office is targeting a tailored ACAT II program with a targeted award in FY 2021.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 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	2,781.214	369.604	Dec 2018	321.639	Dec 2019	-		-		-	632.320	4,104.777	4,413.394
GPS OCX Technical Mission Analysis	MIPR	Various : Various	46.081	16.803	Dec 2018	15.124	Dec 2019	-		-		-	46.182	124.190	-
GPS OCX Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	54.932	0.000	Dec 2018	5.795	Dec 2019	-		-		-	20.595	81.322	88.187
GPS OCX Modernization/ SE & Technical Support	Various	Various : Various	65.035	2.006	Dec 2018	2.650	Dec 2019	-		-		-	0.000	69.691	-
GPS OCX AMCS Facility Dev	Various	Various : Various	1.392	1.000	Mar 2019	-		-		-		-	0.000	2.392	-
GPS OCX Standard Space Trainer (SST)	C/CPAF	Sonalyst, Inc : Waterford, CT	16.500	6.000	Dec 2018	5.000	Dec 2019	-		-		-	0.000	27.500	34.000
GPS OCX Enterprise Mission Planning	C/CPIF	Booz Allen Hamilton Eng Services : El Segundo, CA	22.100	-		5.800	Jan 2020	-		-		-	0.000	27.900	33.700
GPS OCX Phase A Development	Various	Various : Various	289.000	-		-		-		-		-	0.000	289.000	289.000
		Subtotal	3,276.254	395.413		356.008		-		-		-	699.097	4,726.772	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS OCX T&E	C/Various	Various : Various	5.872	6.621	Mar 2019	9.626	Mar 2020	-		-		-	0.000	22.119	-
		Subtotal	5.872	6.621		9.626		-		-		-	0.000	22.119	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS OCX FFRDC	MIPR	Various : Various	143.415	4.636	Oct 2018	4.949	Oct 2019	-		-		-	21.396	174.396	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS OCX A&AS	Various	Various : Various	123.575	26.707	Feb 2019	7.919	Feb 2020	-		-		-	45.213	203.414	-
GPS OCX Other Support	Various	Various : Various	3.363	0.527	Oct 2018	1.840	Oct 2019	-		-		-	1.000	6.730	-
		Subtotal	270.353	31.870		14.708		-		-		-	67.609	384.540	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3,552.479	433.904		380.342		-		-		-	766.706	5,133.431	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
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*

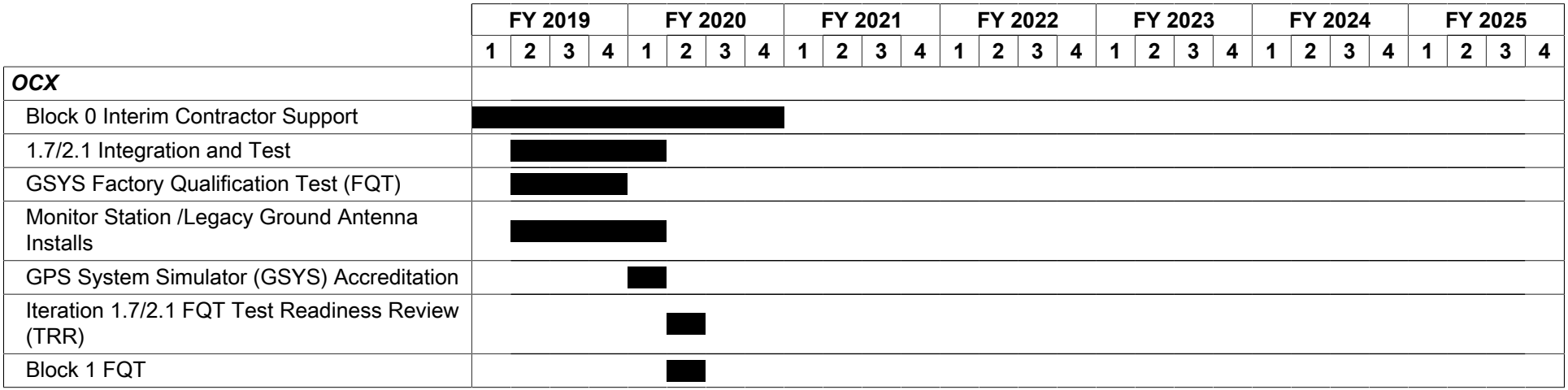

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
OCX				
Block 0 Interim Contractor Support	1	2019	4	2020
1.7/2.1 Integration and Test	2	2019	1	2020
GSYS Factory Qualification Test (FQT)	2	2019	4	2019
Monitor Station /Legacy Ground Antenna Installs	2	2019	1	2020
GPS System Simulator (GSYS) Accreditation	1	2020	1	2020
Iteration 1.7/2.1 FQT Test Readiness Review (TRR)	2	2020	2	2020
Block 1 FQT	2	2020	2	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
67A025: *GPS Enterprise Integrator*	461.338	57.697	64.960	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	583.995
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The GPS Joint Program Office established and maintains the technical baseline and is responsible for the successful fielding of all the GPS Segments (space, control, and user). In order to successfully execute these responsibilities, GPS Enterprise Integrator (EI) creates an enterprise architecture, integrates segment products, verifies the enterprise requirements are adequately met, develops and implements various Systems Engineering documents, defines methods of verification, conducts integrated system test and test analysis, develops and manages the Enterprise technical baseline which reflect multiple stakeholder requirements; Stakeholders include the Department of Defense (DoD), foreign governments, industry, and the general public (through four public 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. Moreover, GPS EI is responsible for delivering a reliable PNT signal capability to military operators, the civil user community, and international partners. In addition, GPS EI validates the system performance in various mission threat scenarios during its development as well as provides in-depth technical expertise to enhance government control, oversight and program accountability. GPS EI is also responsible for all aspects of schedule and technical alignment across the GPS segments (space, control, and user).

More specifically, GPS EI is responsible for technical baseline management, integration, synchronizing, testing, and verifying GPS III, OCX, Military Global Positioning System User Equipment (MGUE), M-Code Early Use (MCEU) and Contingency Operations (COps). 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. The inter-segment tests are required to prove 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. 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 USC, Sec 2281, mandated GPS capabilities, and various other obligations to the international community that provide inter-operable PNT signals.

GPS EI also 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 (U.S.) 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) and Departments of State (DOS), Transportation (DoT), Homeland Security (DHS), and Commerce (DOC). GPS EI Spectrum also ensures GPS priority for eight essential spectrum signals, including those required for civil air navigation and safety of life. 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.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 also provides the GPS enterprise expertise in System Safety, Enterprise level System Security Engineering covering Acquisition Systems Program Security (i.e., personnel, industrial, operations, information, sensitive compartmented information, communication, and physical), Program Protection, Foreign Disclosure, Public Release reviews, Mission System Certification and Accreditation, and Enterprise Cybersecurity. GPS EI is accountable for the development, execution, and analysis of OCX, cybersecurity, and associated test cases necessary to deliver a secure operational system.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: GPS Enterprise Integrator	57.697	64.960	0.000
Description: The integration and technical baseline control of all elements of the GPS system (space/control/user) in support of both military and civil users. Test and verification of integrated system performance in preparation for operational test and evaluation. ***FY 2020 Plans:*** Conduct Phase 2 of Integrated System Test 2-5 that verified operability of GPS III and the COps upgrade to the control segment. Support Operational Test and Evaluation (OT&E) of GPS III and COps. Conduct integrated system test of Core M-Code capability (Integrated System Test 2-6) in preparation for OT&E and operational acceptance of MCEU. Conduct government security test of OCX Block 1. Continue test planning for Integrated System Test (IST) 3-1 (OCX Block 1 and GPS III) and IST 3-2 (OCX Block 1, satellite constellation, and MGUE). Complete IST 3-3 Phase 2 and 3 laboratory tests of MGUE receivers. Conduct IST 3-3 Phase 4 lead platform tests of MGUE. Continue to support MGUE operational test, planning, and execution. Conduct M-Code Live Sky tests in support of OCX development and MGUE field testing. Support launch and on-orbit checkout testing of SVs 03-05. Execute testing for SAASM Mission Planning System (SMPS) 5B. Support Architecture Evolution Plan (AEP) ground antennas and Commercial Off-The-Shelf (COTS) upgrades. Continue cybersecurity tests across all GPS segments (space/control/user). Continue to conduct tests and analyses to protect GPS users from interference sources that threaten performance of GPS receivers. Update GPS technical baseline, specifications, and interface documents to support fielding of OCX. Participate in international Global Navigation Satellite System (GNSS) forums to advocate for GPS regulatory and technical interests. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc. ***FY 2021 Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	57.697	64.960	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTE 04 PE 1203164F: *NAVSTAR Global Positioning System (User Equipment) (Space)*	236.786	320.598	-	-	-	-	-	-	-	0.000	557.384
• RDTE 07 PE 1203265F: *GPS III Space Segment*	139.180	42.440	-	-	-	-	-	-	-	0.000	181.620
• RDTE 05 PE 1203269F: *GPS III Follow-On*	412.202	447.875	-	-	-	-	-	-	-	0.000	860.077
• RDTE 07 PE 1203913F: *NUDET Detection System*	21.578	49.300	-	-	-	-	-	-	-	0.000	70.878
• SPAF 01 Line Item GPSIII: *GPS III Space Segment*	69.386	31.466	-	-	-	-	-	-	-	0.000	100.852
• SPAF 01 GPS IIIF SPAF: *GPS IIIF SPAF*	-	394.625	-	-	-	-	-	-	-	0.000	394.625

Remarks

D. Acquisition Strategy

In accordance with a "back to basics" acquisition approach and the 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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS EI Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	213.203	21.000	Oct 2018	24.248	Dec 2019	0.000		-		0.000	0.000	258.451	309.213
GPS EI Technical Mission Analysis 1	MIPR	Aerospace : El Segundo, CA	94.420	11.592	Oct 2018	11.100	Dec 2019	0.000		-		0.000	0.000	117.112	-
GPS EI Technical Mission Analysis 2	RO	MITRE : Various	91.922	12.962	Oct 2018	11.827	Nov 2019	0.000		-		0.000	0.000	116.711	-
GPS EI MRTA/MSTA	C/CPIF	Draper Labs : Cambridge, MA	10.882	3.140	Dec 2018	3.400	Dec 2019	0.000		-		0.000	0.000	17.422	25.641
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	20.903	4.582	Oct 2018	6.985	Dec 2019	0.000		-		0.000	0.000	32.470	-
GPS EI Additonal Product Development	Various	Various : Various	5.318	1.459	Oct 2018	2.200	Dec 2019	0.000		-		0.000	0.000	8.977	-
		Subtotal	437.968	54.735		59.760		0.000		-		0.000	0.000	552.463	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
EI Integrated Systems Test	Various	Various : El Segundo, CA	0.294	-		-		-		-		-	0.000	0.294	-
		Subtotal	0.294	-		-		-		-		-	0.000	0.294	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS EI FFRDC	Various	Various : El Segundo, CA	1.583	0.165	Oct 2018	0.165	Dec 2019	0.000		-		0.000	0.000	1.913	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS EI A&AS	Various	Various : El Segundo, CA	20.022	2.297	Oct 2018	4.635	Dec 2019	0.000		-		0.000	0.000	26.954	-
GPS EI Other Support	Various	Various : Various	1.471	0.500	Oct 2018	0.400	Oct 2019	0.000		-		0.000	0.000	2.371	-
		Subtotal	23.076	2.962		5.200		0.000		-		0.000	0.000	31.238	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	461.338	57.697		64.960		0.000		-		0.000	0.000	583.995	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
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*

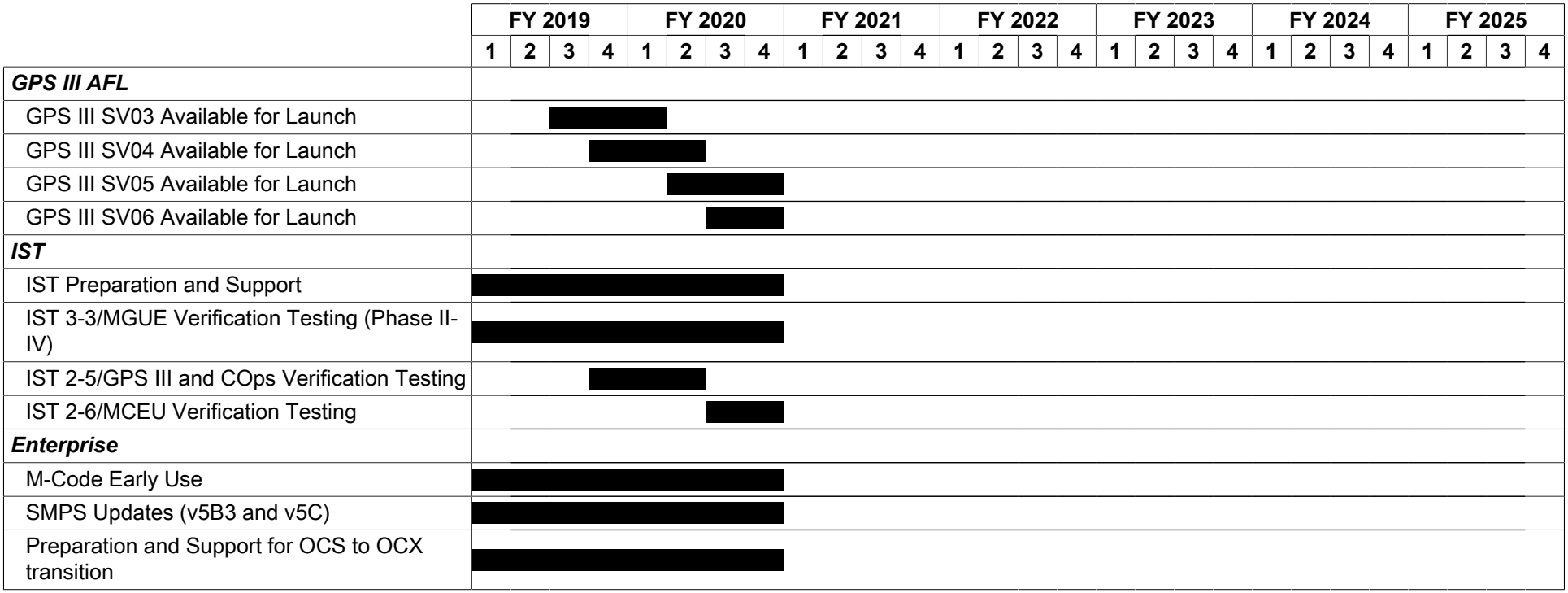

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
GPS III AFL				
GPS III SV03 Available for Launch	3	2019	1	2020
GPS III SV04 Available for Launch	4	2019	2	2020
GPS III SV05 Available for Launch	2	2020	4	2020
GPS III SV06 Available for Launch	3	2020	4	2020
IST				
IST Preparation and Support	1	2019	4	2020
IST 3-3/MGUE Verification Testing (Phase II-IV)	1	2019	4	2020
IST 2-5/GPS III and COps Verification Testing	4	2019	2	2020
IST 2-6/MCEU Verification Testing	3	2020	4	2020
Enterprise				
M-Code Early Use	1	2019	4	2020
SMPS Updates (v5B3 and v5C)	1	2019	4	2020
Preparation and Support for OCS to OCX transition	1	2019	4	2020