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 1206423F / *Global Positioning System III - Operational Control Segment*							
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	2,804.399	344.226	513.268	510.938	0.000	510.938	441.609	342.573	239.099	156.088	173.300	5,525.500
67A021: *OCX*	2,517.555	283.170	451.362	447.382	0.000	447.382	377.236	277.124	171.790	90.698	107.300	4,723.617
67A025: *GPS Enterprise Integrator*	286.844	61.056	61.906	63.556	0.000	63.556	64.373	65.449	67.309	65.390	66.000	801.883
Program MDAP/MAIS Code: 456												

Note

In FY2018, PE 0603423F, Global Positioning System III - Operational Control Segment efforts were transferred to PE 1206423F, Global Positioning System III - Operational Control Segment due to the creation of a new Major Force Program for Space. FY2016 and FY2017 funding is now documented in the exhibits for PE 1206423F.

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 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.

This Program Element (PE) funds the Research & Development (R&D) for the GPS next generation operational control system (OCX) and the GPS Enterprise Integrator (EI). This includes advanced concept development, systems analysis, modernized control segment development, 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 DoD information assurance and cybersecurity controls and capabilities. GPS Enterprise Integrator 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, 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-approved required capabilities.

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 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 Enterprise Integrator 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 Enterprise Integrator 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, the Enterprise Integrator 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 Enterprise Integrator 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, the GPS Enterprise Integrator delivers Test and Verification capabilities, Requirements and Interface Management, and Systems Integration support across the Space, Control, and User Segments. In this capacity, the Enterprise Integrator is responsible for managing this cross-program work to provide these and other capabilities.

GPS Enterprise Integrator'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 Integrator: 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 Enterprise Integrator performs all these efforts across all GPS programs in all acquisition phases. The government owns the Enterprise system requirements and integration, and highly leverages the Enterprise Integrator team to eliminate the need to fund a development prime contractor to perform these functions. This enhances government control, oversight and program accountability.

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.

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 1206423F / *Global Positioning System III - Operational Control Segment*			
B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	349.181	393.268	252.530	0.000	252.530
Current President's Budget	344.226	513.268	510.938	0.000	510.938
Total Adjustments	-4.955	120.000	258.408	0.000	258.408
• 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	9.999	0.000			
• SBIR/STTR Transfer	-14.954	0.000			
• Other Adjustments	0.000	120.000	258.408	0.000	258.408

Change Summary Explanation

FY2016: +$9.999M to fund OCX to cost estimate

FY2017: +$120.000M FY17 Request for Additional Appropriation (RAA) to fund OCX to cost estimate

FY2018: +$258.408 to fund OCX to cost estimate (Nunn-McCurdy Certification)

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
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 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
67A021: *OCX*	2,517.555	283.170	451.362	447.382	0.000	447.382	377.236	277.124	171.790	90.698	107.300	4,723.617
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, 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.

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 (adds Iteration 2.2 to Block 1) fields the advanced operational capability to control the advanced features of the modernized military signals (L1M and L2M (M-Code)).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: OCX Development	259.056	415.610	410.251
Description: Development of the GPS next generation operational control system to launch GPS III, operate a mixed GPS II and GPS III constellation, and provide for a robust Information Assurance system.			
FY 2016 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
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 2016	FY 2017	FY 2018
Conducted Block 0 factory qualification testing and continued security certification activities leading to Authority to Operate (ATO). Completed Iteration 1.5 (Block 1) risk reduction testing and continued Iteration 1.6 (Block 1) software development and integration activities. Conducted qualification testing and production for OCX Monitor Station Receiver Element (OMSRE). Continued development of the remaining modernized civil and military signals. SECAF declared Nunn-McCurdy breach on 30 Jun 16. The program is targeting June 2017 for a Defense Acquisition Board and Milestone B recertification. ***FY 2017 Plans:*** Complete Block 0 site acceptance testing, receive approval to operate and connect, and certify and accept Block 0 for launch and checkout operations of GPS III satellites. Begin Iteration 1.6 software coding, integration and testing, and begin Iteration 1.7 and 2.1 software development and integration activities. Begin qualification testing for system simulator and begin accreditation process. Begin shipping, installation, and receive interim authority to test and integrate the monitoring stations equipment and OMSRE. Begin Iteration 2.2 (Block 2) systems engineering. Continue security certification activities leading to ATO. The program is targeting 22 Jun 2017 for a Defense Acquisition Board and Milestone B re-certification. Nunn-McCurdy re-certification was approved on 12 Oct 16, to include program re-plan/restructure. ***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 OMSRE. Continue testing and integration activities for Iteration 1.6. Continue security certification activities leading to ATO. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc.			
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 including Technical Mission Analysis, Modernization SE and Technical Support, and Test and Evaluation. ***FY 2016 Accomplishments:*** Continued work on the SST and developed demonstration capabilities; continued development of Enterprise Mission Planning Systems. Continued work and began fielding to facilities to include the Mission Control Station (MCS), Alternate Mission Control Station (AMCS), sustainment assets and remote monitor station sites. Continued FFRDC direct support for development activities. ***FY 2017 Plans:***	24.114	35.752	37.131

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
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 2016	FY 2017	FY 2018
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 MCS, AMCS, and remote monitor station sites. Continue FFRDC direct support for development activities. ***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 MCS, AMCS, and remote monitor station sites.			
Accomplishments/Planned Programs Subtotals	283.170	451.362	447.382

C. 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
• RDTE: BA07: PE 1205265F: *GPS III Space Segment*	147.398	179.188	243.435	0.000	243.435	127.699	44.129	12.254	8.771	40.618	803.492
• SPAF: BA01: Line Item # GPSIII: *GPS III Space Segment*	198.370	34.059	85.894	0.000	85.894	783.805	796.375	779.683	1,131.497	7,395.744	11,205.427
• DOT: *DOT (FAA) Civil Funding*	0.000	13.300	11.400	0.000	11.400	0.000	0.000	0.000	0.000	0.000	24.700

Remarks

DOT (FAA) funding in FY 2016 $13.3M - $11.4M expected in FY2017/FY2018.

D. Acquisition Strategy

The Air Force is pursuing a "Block" approach to the next generation GPS control segment (OCX) 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 C2) on-ramps for the follow-on contract for GPS III 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: FY 2018 Air Force			Date: May 2017
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 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
GPS OCX Phase B OCX Block 1 & 2 Development	C/CPAF	Raytheon : Aurora, CO	1,871.003	242.584	Dec 2015	389.226	Dec 2016	382.642	Dec 2017	0.000		382.642	812.783	3,698.238	2,911.600
GPS OCX Technical Mission Analysis	MIPR	Various : Various	3.063	13.734	Oct 2015	15.619	Dec 2016	16.860	Dec 2017	0.000		16.860	69.940	119.216	-
GPS OCX Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	45.049	4.391	Dec 2015	4.063	Dec 2016	3.029	Dec 2017	0.000		3.029	15.116	71.648	-
GPS OCX Modernization/ SE & Technical Support	Various	Various : Various	58.147	4.280	Jan 2016	2.233	Dec 2016	0.450	Dec 2017	0.000		0.450	22.485	87.595	-
GPS OCX AMCS Facility Dev	Various	Various : Various	0.372	0.300	Mar 2016	0.100	Mar 2017	0.000		0.000		0.000	0.000	0.772	-
GPS OCX Standard Space Trainer (SST)	C/CPAF	Sonalyst, Inc : Waterford, CT	11.500	5.000	Jan 2016	2.500	Dec 2016	5.000	Dec 2017	0.000		5.000	15.000	39.000	-
GPS OCX Enterprise Mission Planning	C/CPIF	Booz Allen Hamilton Eng Services : El Segundo, CA	10.000	0.000		6.300	Jan 2017	5.800	Jan 2018	0.000		5.800	3.700	25.800	-
GPS OCX Phase A Development	Various	Various : Various	289.000	0.000		0.000		0.000		0.000		0.000	0.000	289.000	-
		Subtotal	2,288.134	270.289		420.041		413.781		0.000		413.781	939.024	4,331.269	-

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
		Subtotal	-	-		-		-		-		-	-	-	-

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
GPS OCX T&E	C/CPAF	Various : Various	1.600	0.800	Mar 2016	9.000	Mar 2017	9.021	Mar 2018	0.000		9.021	0.000	20.421	-
		Subtotal	1.600	0.800		9.000		9.021		0.000		9.021	0.000	20.421	-

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 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 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
GPS OCX FFRDC	MIPR	Various : Various	124.550	2.781	Jan 2016	8.705	Oct 2016	7.773	Oct 2017	0.000		7.773	31.814	175.623	-
GPS OCX A&AS	Various	Various : Various	102.106	8.500	Feb 2016	12.696	Feb 2017	16.357	Feb 2018	0.000		16.357	50.880	190.539	-
GPS OCX Other Support	Various	Various : Various	1.165	0.800	Oct 2015	0.920	Oct 2016	0.450	Oct 2017	0.000		0.450	2.430	5.765	-
		Subtotal	227.821	12.081		22.321		24.580		0.000		24.580	85.124	371.927	-

	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	2,517.555	283.170		451.362		447.382		0.000		447.382	1,024.148	4,723.617	-

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 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*

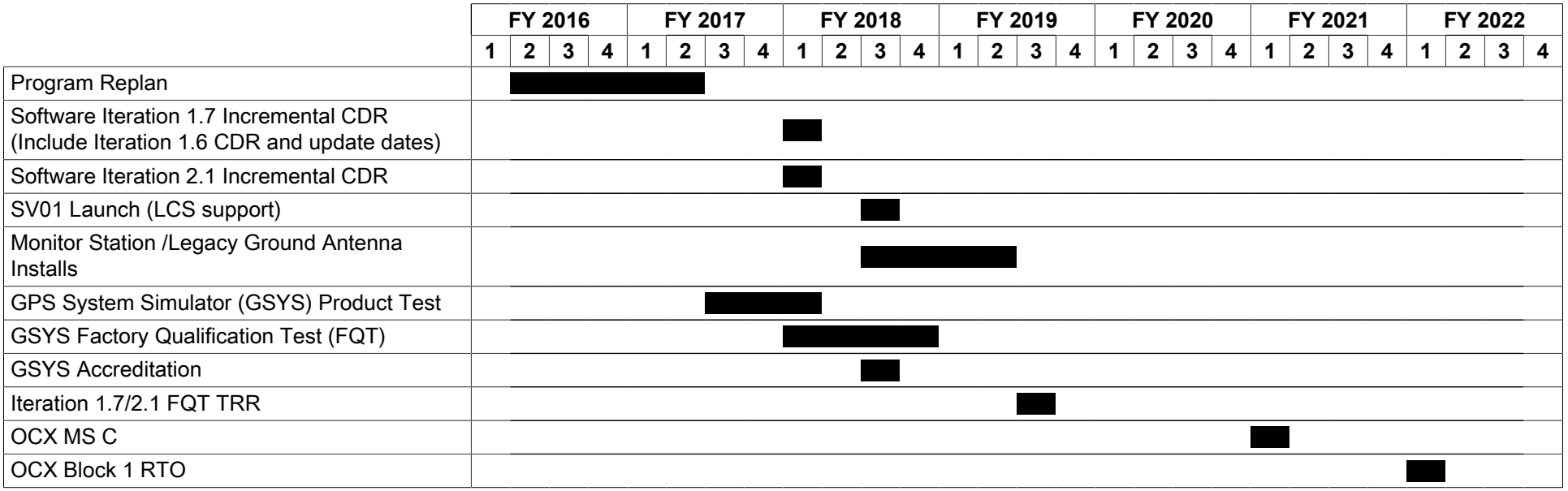

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A021 / *OCX*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Program Replan	2	2016	2	2017
Software Iteration 1.7 Incremental CDR (Include Iteration 1.6 CDR and update dates)	1	2018	1	2018
Software Iteration 2.1 Incremental CDR	1	2018	1	2018
SV01 Launch (LCS support)	3	2018	3	2018
Monitor Station /Legacy Ground Antenna Installs	3	2018	2	2019
GPS System Simulator (GSYS) Product Test	3	2017	1	2018
GSYS Factory Qualification Test (FQT)	1	2018	4	2018
GSYS Accreditation	3	2018	3	2018
Iteration 1.7/2.1 FQT TRR	3	2019	3	2019
OCX MS C	1	2021	1	2021
OCX Block 1 RTO	1	2022	1	2022

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
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 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
67A025: *GPS Enterprise Integrator*	286.844	61.056	61.906	63.556	0.000	63.556	64.373	65.449	67.309	65.390	66.000	801.883
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) Enterprise Integrator (EI) integrates, synchronizes, tests and verifies the three ACAT I Defense Acquisition Programs that constitute the GPS Enterprise to deliver reliable Positioning, Navigation, and Timing (PNT) signal capability to military operators, the civil user community, and international partners. 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). To successfully execute its responsibilities, the Government relies upon the specific expertise of the GPS Enterprise Integrator to architect the enterprise, integrate segment products, and verify that overall enterprise requirements are met.

The GPS Enterprise Integrator project is responsible for the development and management of the Enterprise technical baseline reflecting the requirements of multiple stakeholder groups such as the Department of Defense (DoD), foreign governments and allies, industry, the general public (through four Interface specifications), and ensures GPS capabilities meet the needs of warfighters, civil agencies, commercial entities, international treaties, and over four billion global GPS users. The Enterprise Integrator manages the process through which the JROC validated requirements are matured and flowed down to the segments of the system consistent with clearly defined interfaces. This enables the GPS system to meet Title 10 of the U.S. Code, Section 2281, mandated GPS capabilities as well as obligations to the international community and allied nations to provide inter- operable PNT signals. The Enterprise Integrator is also responsible for all aspects of schedule and technical alignment across the segments. The Enterprise Integrator creates and manages plans that provide for early exercise of the products under development, compatibility analysis, and intersegment testing thereby reducing risk. The intersegment tests are required to prove the interoperability of the GPS next generation operational control system (OCX), GPS III satellites, and modernized user equipment. The Enterprise Integrator's test efforts also extend to validating that GPS can be used for civil aircraft navigation.

The Enterprise Integrator activity supports the Government Joint Program Office's GPS spectrum protection at international forums such as the International Telecommunications Union, assisting the United States when negotiating with foreign partners. In addition, the Enterprise Integrator provides technical expertise and continuity for maintaining relationships with other U.S. government agencies to include the FAA, NGA, NASA, as well as the Departments of State, Transportation, Homeland Security, and Commerce. Spectrum expertise from the Enterprise Integrator ensures GPS priority over eight essential spectrum signals such as the safety of life signal, L5, which is required for civil air navigation. Spectrum Protection prevents encroachment from commercial or foreign entities, which preserves reliable signals to warfighters and civil users, ensuring military operations and the integrity of the global economic infrastructure. The Enterprise Integrator is the GPS enterprise expert for Cybersecurity, System Safety, and System Security, ultimately ensuring a protected GPS Signal for both the military and civil users from emerging cyber threats. The Enterprise Integrator is accountable for the development, execution, and analysis of OCX, cybersecurity and associated test cases, which are necessary to deliver a secure, operational system, protected against adversarial cyber-attacks intended to deny, disrupt, or degrade GPS operations.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force		Date: May 2017
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*

The Enterprise Integrator 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. The Enterprise Integrator validates the system performance in various mission threat scenarios during its development. The Enterprise Integrator provides deep, technical, highly specific expertise. The GPS EI functions enhance government control, oversight and program accountability.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: GPS Enterprise Integrator	61.056	61.906	63.556
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 2016 Accomplishments:*** Completed Integrated System Test (IST) Phase 1 Military Global Positioning System User Equipment (MGUE) verification tests. Initiated IST 3-3 Phase 2 MGUE Field Test and IST 3-3 Phase 3 Environmental Test. Conducted launch and early orbit operation rehearsals on the delivered system between ground and space segment in support of SV01 launch. Continued Launch and Checkout Capability/Launch and Checkout System (LCS) Enterprise Assessments. Supported SV01 Functional Configuration Audit/Physical Configuration Audit. Conducted multiple system integration demos. Continued developing Selective Availability Anti-Spoofing Module (SAASM) Mission Planning System (SMPS) V5 and Architecture Evolution Plan (AEP)/Modernized Navigation (MODNAV) in support of M-Code Available for Use milestone. ***FY 2017 Plans:*** Complete IST 3-3 Phase 2 and 3 testing. Complete planning for IST 3-3 Phase 4 MGUE tests. Initiate IST 2-5 (COps + GPSIII) and IST 2-6 (MCEU) planning. Initiate GPS III end to end testing with GPS III, LCS, and MGUE lead platform. SMPS build 5.B.1 fielding and development testing begins. Planning for SMPS 5.B.3 system integration testing begins. Cybersecurity testing for MGUE and SMPS will continue. Conduct launch and early orbit operation planning and rehearsals on the delivered system between ground and space segments in support of SV01 launch. Initiate planning for early M-Code Operational Test through AEP. ***FY 2018 Plans:*** Support MGUE operational test planning. Continued execution of MGUE DT (Phases 2-4). Support launch of SV01. SPMP 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 M-Code monitoring for Early Use integration and Command and Control of M-Code on AEP. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, etc.			
Accomplishments/Planned Programs Subtotals	61.056	61.906	63.556

Exhibit R-2A, RDT&E Project Justification: FY 2018 Air Force			Date: May 2017
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 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
• RDTE: BA04: PE 1203164F: *NAVSTAR Global Positioning System (User Equipment) (Space)*	143.118	278.147	253.939	0.000	253.939	195.528	143.666	130.109	74.803	260.902	1,480.212
• RDTE: BA07: PE 1203265F: *GPS III Space Segment*	147.398	179.188	243.435	0.000	243.435	127.699	44.129	12.254	8.771	40.618	803.492
• RDTE: BA07: PE 1203913F: *NUDET Detection System*	14.403	21.093	31.508	0.000	31.508	19.927	17.100	14.269	14.561	Continuing	Continuing
• SPAF: BA01: Line Item # MGPS00: *Global Positioning System (Space*	64.135	13.171	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	77.306
• SPAF: BA01: Line Item # GPSIII: *GPS III Space Segment*	198.370	34.059	85.894	0.000	85.894	783.805	796.375	779.683	1,131.497	7,395.744	11,205.427

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. GPS Enterprise Integrator function of the SE&I contractor is currently funded within this Program Element (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: FY 2018 Air Force		Date: May 2017
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 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
GPS EI Enterprise SE&I	C/CPAF	TASC : El Segundo, CA	154.559	22.676	Oct 2015	22.048	Jun 2017	22.168	Oct 2017	0.000		22.168	104.441	325.892	-
GPS EI Technical Mission Analysis 1	MIPR	Aerospace : El Segundo, CA	62.155	11.200	Oct 2015	11.200	Jun 2017	11.536	Oct 2017	0.000		11.536	62.928	159.019	-
GPS EI Technical Mission Analysis 2	RO	MITRE : Various, MA	61.309	8.975	Jan 2016	10.136	Jun 2017	10.440	Oct 2017	0.000		10.440	57.680	148.540	-
GPS EI MRTA/MSTA	C/CPIF	Draper Labs : Cambridge, MA	0.000	4.025	Dec 2015	3.400	May 2017	3.400	Dec 2017	0.000		3.400	17.000	27.825	-
GPS EI Enterprise Mission Planning	C/CPIF	TBD : El Segundo, CA	0.000	1.320	Oct 2015	0.000		0.000		0.000		0.000	0.000	1.320	-
GPS EI Cybersecurity	TBD	TBD : El Segundo, CA	0.000	8.084	Oct 2015	8.490	May 2017	8.863	Oct 2017	0.000		8.863	47.483	72.920	-
GPS EI Additonal Product Development	Various	Various : Various, CA	1.556	1.300	Oct 2015	1.301	Jul 2017	1.378	Oct 2017	0.000		1.378	11.371	16.906	-
		Subtotal	279.579	57.580		56.575		57.785		0.000		57.785	300.903	752.422	-

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
		Subtotal	-	-		-		-		-		-	-	-	-

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
EI Integrated Systems Test	Various	Various : El Segundo, CA	0.000	0.000		0.000		1.200	Apr 2018	0.000		1.200	5.400	6.600	-
		Subtotal	0.000	0.000		0.000		1.200		0.000		1.200	5.400	6.600	-

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 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 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
GPS EI FFRDC	Various	Various : El Segundo, CA	0.000	0.178	Oct 2015	0.939	Jun 2017	0.614	Oct 2017	0.000		0.614	2.264	3.995	-
GPS EI A&AS	Various	Various : El Segundo, CA	6.738	2.728	Oct 2015	4.012	Jul 2017	3.647	Oct 2017	0.000		3.647	18.954	36.079	-
GPS EI Other Support	Various	Various : Various	0.527	0.570	Oct 2015	0.380	Oct 2016	0.310	Oct 2017	0.000		0.310	1.000	2.787	-
		Subtotal	7.265	3.476		5.331		4.571		0.000		4.571	22.218	42.861	-

	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	286.844	61.056		61.906		63.556		0.000		63.556	328.521	801.883	-

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 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

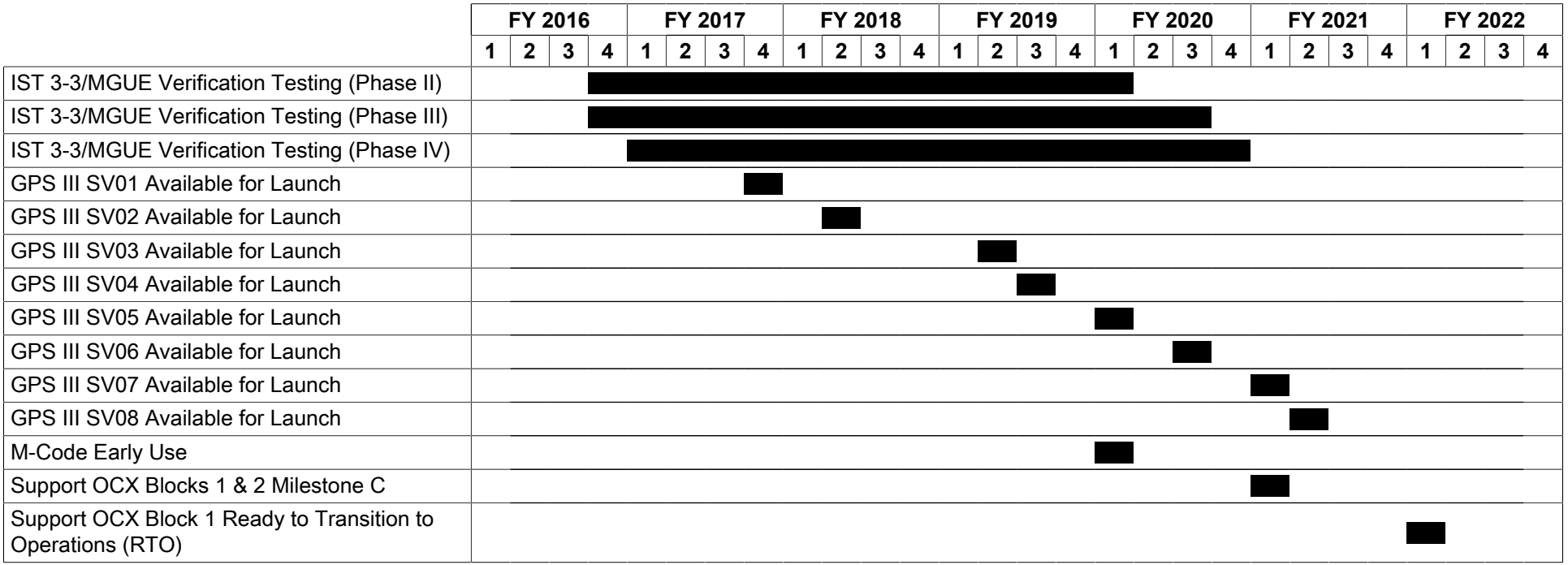

Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force		Date: May 2017
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 1206423F / *Global Positioning System III - Operational Control Segment*	**Project (Number/Name)** 67A025 / *GPS Enterprise Integrator*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
IST 3-3/MGUE Verification Testing (Phase II)	4	2016	1	2020
IST 3-3/MGUE Verification Testing (Phase III)	4	2016	3	2020
IST 3-3/MGUE Verification Testing (Phase IV)	1	2017	4	2020
GPS III SV01 Available for Launch	4	2017	4	2017
GPS III SV02 Available for Launch	2	2018	2	2018
GPS III SV03 Available for Launch	2	2019	2	2019
GPS III SV04 Available for Launch	3	2019	3	2019
GPS III SV05 Available for Launch	1	2020	1	2020
GPS III SV06 Available for Launch	3	2020	3	2020
GPS III SV07 Available for Launch	1	2021	1	2021
GPS III SV08 Available for Launch	2	2021	2	2021
M-Code Early Use	1	2020	1	2020
Support OCX Blocks 1 & 2 Milestone C	1	2021	1	2021
Support OCX Block 1 Ready to Transition to Operations (RTO)	1	2022	1	2022