Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force											Date: February 2019	
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 1203269F / *GPS III Follow-On (GPS IIIF)*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.000	426.889	462.875	0.000	462.875	279.423	258.041	294.800	286.368	Continuing	Continuing
653170: *GPS IIIF*	-	0.000	426.889	462.875	0.000	462.875	279.423	258.041	294.800	286.368	Continuing	Continuing
Quantity of RDT&E Articles	-	-	2	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Global Positioning System (GPS) is a space-based navigation system that fills validated Joint Service requirements for worldwide, accurate, common grid three-dimensional positioning/navigation for military aircraft, ships, and ground personnel. The consistent accuracy, unaffected by location or weather and available in real time, significantly improves effectiveness of reconnaissance, weapons delivery, mine countermeasures and rapid deployment for all services. GPS must comply with Title 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.

The system is composed of three segments: User Equipment (funded under Program Element (PE) 1203164F), Space (funded under PE 1203265F, 1203165F, and 1203269F), and a Control Network (funded under PE 1206423F and 1203165F). The satellites broadcast high-accuracy data using precisely synchronized signals that are received and processed by user equipment installed in military platforms. This equipment computes the platform position and velocity and provides steering vectors to target locations or navigation waypoints. The control segment provides daily updates to the navigation messages broadcast from the satellites to maintain system precision in three dimensions to 16 meters (spherical error probable) worldwide. Additionally, GPS supports the United States Nuclear Detonation (NUDET) Detection System (USNDS) mission and provides strategic and tactical support to the following Department of Defense (DoD) missions: Joint Operations by providing capabilities for Positioning, Navigation, and Timing (PNT); Command, Control, Communications, and Intelligence (C3I); Special Operations; Military Operations in Urban Terrain (MOUT); Defense-Wide Mission Support (DWMS); Air Mobility; and Space Launch Orbital Support.

GPS IIIF delivers GPS III satellites beyond the first ten SVs being delivered by the GPS III program (funded in PE 1203265F GPS III Space Segment). The GPS IIIF satellites maintain the same capabilities as the GPS III satellites, but also delivers significant enhancements to include: backward compatibility, unified S-Band (USB) interface compliance, integration of hosted payloads (redesigned USNDS), Laser Retro-reflector Arrays (LRAs), Search and Rescue/GPS (SAR/GPS), Energetic Charged Particles (ECP) sensor, and Regional Military Protection (RMP) capabilities that provide the ability to deliver high-power regional Military Code (M-Code) signals in specific areas of intended effect. Implementation of RMP into the GPS Enterprise requires integration with the ground and user segments, executed by the GPS Next Generation Operational Control System (OCX) and Military GPS User Equipment (MGUE) programs, respectively. The SAR/GPS payload provided by Canada fills a validated National Search and Rescue Committee requirement to provide enduring, space-based distress alerting capability to detect, locate, and relay distress alerts to fulfill its responsibilities under international agreements for Search and Rescue. LRA, built by the Naval Research Lab (NRL), is a passive reflector that improves accuracy and provides better ephemeris data. National Geospatial-Intelligence Agency (NGA) funds the integration costs of the LRA.

This PE funds the Research, Development, Test, and Evaluation (RDT&E) of GPS IIIF SVs 11-12 (to include Non-Recurring Engineering (NRE) support efforts). This program includes risk-reducing simulators and systems engineering associated with delivering the new capabilities required of GPS IIIF satellites.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force	Date: February 2019
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 1203269F / *GPS III Follow-On (GPS IIIF)*

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 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 GPS IIIF Space Segment weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

Re-Phasing of GPS IIIF Buy Across FYDP saved $11.360M in FY 2020. Re-Phasing of GPS IIIF Buy Across FYDP description: Based on an adjustment for contract type, execution realism, and proposals, the Air Force is realigning GPS IIIF funding to the Service Cost Position (SCP). All GPS program adjustments will fund higher priority space initiatives to improve lethality.

As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is $14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	451.889	474.235	0.000	474.235
Current President's Budget	0.000	426.889	462.875	0.000	462.875
Total Adjustments	0.000	-25.000	-11.360	0.000	-11.360
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-25.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-11.360	0.000	-11.360

Change Summary Explanation

FY 2019: -$25.000M Congressional Mark due to insufficient justification

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force	Date: February 2019
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 1203269F / *GPS III Follow-On (GPS IIIF)*

FY 2020: -$11.360M Reduce GPS IIIF Program funding to Service Cost Position (SCP)

C. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: GPS IIIF (Follow-On) Development	-	426.889	462.875
Description: The program utilizes RDT&E funds to develop and deliver SVs 11-12, conduct the NRE of developing risk-reducing simulators, developing support test equipment, and conducting the systems engineering associated with delivering the new capabilities required of GPS IIIF including backward compatibility, dual band Telemetry, Tracking, and Control (TT&C), integration of Government Furnished Equipment (GFE) hosted payloads, and RMP, which delivers high power regional M-Code signals in specific areas of intended effect. ***FY 2019 Plans:*** The program initiated efforts to complete an Integrated Baseline Review with Lockheed Martin in Q2FY19 to prepare for and to conduct a Critical Design Review (CDR) campaign from Q2FY19 through Q2FY20, continue development of SVs 11-12, and prepare for Milestone C in Q3FY20. Continue program office support and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc. ***FY 2020 Plans:*** The program office will complete Critical Design Review (CDR), continue non-recurring engineering efforts and hardware purchases to support SVs 11-12 development, GPS III Follow-On Production Non-flight Satellite Testbed (GNST+), and software simulators. Conduct Milestone C in Q3FY20 in preparation to exercise production satellite buys. 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 2019 to FY 2020 Increase/Decrease Statement:*** FY 2020 increased compared to FY 2019 by $35.986M. Justification for this increase is described in plans above.			
Accomplishments/Planned Programs Subtotals	-	426.889	462.875

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTE 07 1203265F: *GPS III Space Segment*	233.043	141.892	42.440	-	42.440	10.780	7.296	7.451	7.585	5.900	456.387
• SPAF 01 Line Item: GPS III: *GPS III Space Segment*	84.064	69.386	31.466	-	31.466	20.143	21.320	19.332	19.680	26.400	291.791

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force	Date: February 2019
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 1203269F / *GPS III Follow-On (GPS IIIF)*

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• SPAF 01 GPS IIIF	-	-	414.625	-	414.625	628.445	890.355	897.544	962.300	Continuing	Continuing
SPAF: *GPS IIIF SPAF*											

Remarks

E. Acquisition Strategy

In December 2017, Principal Deputy Office of the Assistant Secretary of the Air Force (Acquisition & Logistics) declared the GPS IIIF program a new start beginning in FY 2019 and, consistent with the 2016 National Defense Authorization Act, the program was categorized as an Acquisition Category (ACAT) IB Major Defense Acquisition Program (MDAP) with the Service Acquisition Executive (SAE) serving as the Milestone Decision Authority (MDA). During this time, the MDA approved the second phase of the two-phased GPS III Follow-On acquisition strategy. Executed using funds in PE 1203265F, GPS III Space Segment, the Phase 1 Production Readiness Feasibility Assessments conducted during FY 2016-2017 provided data and insight into contractors' GPS satellite production designs with emphasis on a mature navigation payload and production-ready designs. Phase 1 results affirmed the viability of a competitive approach for Phase 2. The Phase 2 strategy directed the Air Force to conduct a full-and-open competition for GPS IIIF space vehicles and specified the use of RDT&E funds to deliver SVs 11-12 and conduct associated NRE. In addition to SVs 11-12, the RDT&E effort will be comprised of developing risk-reducing simulators, support test equipment, and conducting the systems engineering associated with delivering the new capabilities required of GPS IIIF. The Air Force awarded the contract to Lockheed Martin in September 2018 and began the Integrated Baseline Review (IBR) in October 2018. Upon IBR completion, the 1-year CDR campaign will begin in Q2FY19. Upon Milestone C approval, the Air Force will procure SV 13+ via annual contract options exercised using Space Procurement, Air Force funds consistent with full-funding policy under an annual buy approach.

F. Performance Metrics

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203269F / *GPS III Follow-On (GPS IIIF)*	Project (Number/Name) 653170 / *GPS IIIF*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS IIIF Development	C/Various	Lockheed Martin : Littleton, CO	-	-		368.823	Nov 2018	411.366	Dec 2019	-		411.366	Continuing	Continuing	-
GPS IIIF Technical Mission Analysis	MIPR	Various : Various	-	-		8.384	Dec 2018	11.086	Dec 2019	-		11.086	Continuing	Continuing	-
GPS IIIF Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	-	-		13.470	Dec 2018	13.936	Dec 2019	-		13.936	Continuing	Continuing	-
		Subtotal	-	-		390.677		436.388		-		436.388	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS IIIF Test and Evaluation	Various	Various : Various	-	-		1.140	Mar 2019	1.917	Mar 2020	-		1.917	Continuing	Continuing	-
		Subtotal	-	-		1.140		1.917		-		1.917	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GPS IIIF FFRDC	MIPR	Aerospace Corp : El Segundo, CA	-	-		7.345	Dec 2018	3.695	Dec 2019	-		3.695	Continuing	Continuing	-
GPS IIIF A&AS	Various	Various : El Segundo, CA	-	-		27.327	Jan 2019	20.475	Dec 2019	-		20.475	Continuing	Continuing	-
GPS IIIF Other Support	Various	Various : El Segundo, CA	-	-		0.400	Oct 2018	0.400	Oct 2019	-		0.400	Continuing	Continuing	-
		Subtotal	-	-		35.072		24.570		-		24.570	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		426.889		462.875		-		462.875	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203269F / *GPS III Follow-On (GPS IIIF)*	Project (Number/Name) 653170 / *GPS IIIF*	

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

FINANCIAL PERFORMANCE: GPS IIIF is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the GPS IIIF Development and Production Acquisition phases contract is a Fixed Price Incentive Fee (FPIF) contract with progress payments. Up to 8 percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1203269F / *GPS III Follow-On (GPS IIIF)*	**Project (Number/Name)** 653170 / *GPS IIIF*

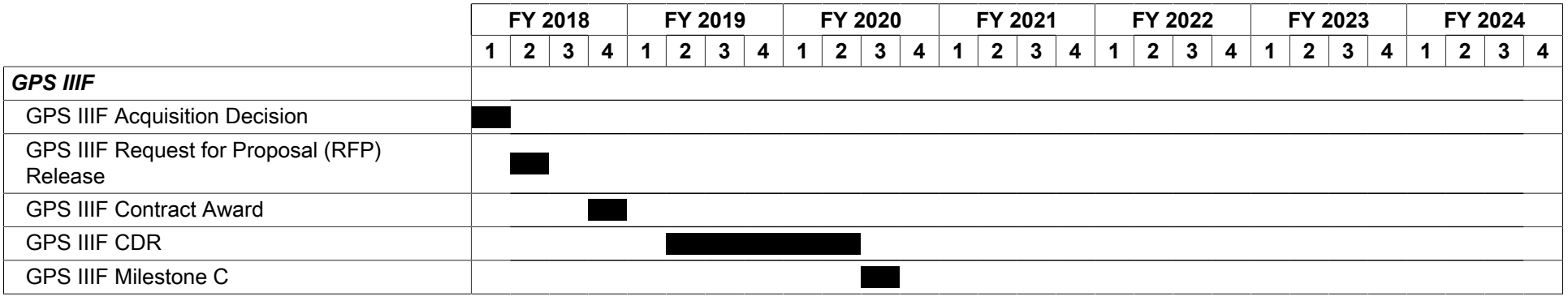

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1203269F / *GPS III Follow-On (GPS IIIF)*	**Project (Number/Name)** 653170 / *GPS IIIF*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
GPS IIIF				
GPS IIIF Acquisition Decision	1	2018	1	2018
GPS IIIF Request for Proposal (RFP) Release	2	2018	2	2018
GPS IIIF Contract Award	4	2018	4	2018
GPS IIIF CDR	2	2019	2	2020
GPS IIIF Milestone C	3	2020	3	2020