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 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 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	202.760	412.202	447.875	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,062.837
653170: *GPS IIIF*	202.760	412.202	447.875	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,062.837
Quantity of RDT&E Articles	-	2	-	-	-	-	-	-	-	-		
Program MDAP/MAIS Code: 590												

A. Mission Description and Budget Item Justification

In FY2021, PE 1203269F, GPS III Follow-On (GPS IIIF) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203269SF GPS III Follow-On (GPS IIIF) from Appropriation 3600, Budget Activity 5 due to the creation of a new Appropriation for Space Force.

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. The user 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 Space Vehicles (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 deliver significant enhancements to include: backward compatibility, unified S-Band (USB) interface compliance, integration of hosted payloads including a redesigned USNDS payload, Laser Retro-reflector Arrays (LRAs), Search and Rescue/ GPS (SAR/GPS) and 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), along with the 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.

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.

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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	426.889	462.875	279.423	0.000	279.423
Current President's Budget	412.202	447.875	0.000	0.000	0.000
Total Adjustments	-14.687	-15.000	-279.423	0.000	-279.423
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-15.000			
• 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	-14.687	0.000			
• Other Adjustments	0.000	0.000	-279.423	0.000	-279.423

Change Summary Explanation

FY2020: -$15.000M Re-sorting acquisition accountability. Excess to need.
FY2021: -$263.496M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

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 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 1203269F / *GPS III Follow-On (GPS IIIF)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: GPS III Follow-On (GPS IIIF) Development	412.202	447.875	0.000
Description: The program utilizes RDT&E funds to develop and deliver SVs 11-12, conduct the NRE of develop 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 2020 Plans:*** Complete Critical Design Review (CDR) and continue NRE efforts and hardware purchases to support SVs 11-12 development, GPS IIIF 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, continued program office support, studies, technical analysis, experimentation, prototyping, etc. Continue program office support and other related support activities that may include, but are not limited to, studies, technical analysis, experimentation, prototyping, etc. ***FY 2021 Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A			
Accomplishments/Planned Programs Subtotals	412.202	447.875	0.000

D. 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
• SPAF 01 GPS03C: *GPSIII Follow On*	-	414.625	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	414.625
• RDTE 07 1203265F: *GPS III Space Segment*	72.096	42.440	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	114.536
• 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

Remarks

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 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 1203269F / *GPS III Follow-On (GPS IIIF)*

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 Fiscal Year 2016 National Defense Authorization Act (NDAA), the program was categorized as an Acquisition Category (ACAT) (1B) 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 1-year CDR campaign in March 2019. Completion of CDR is scheduled for March 2020 followed by Milestone C in Q3FY20. Upon Milestone C approval, the Air Force will procure SV 13+ via annual contract options exercised using Space Procurement, Air Force (SPAF) funds consistent with full-funding policy under an annual buy approach.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force		Date: February 2020
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 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 IIIF Development	C/FPIF	Lockheed Martin : Littleton, CO	189.393	349.026	Nov 2018	403.438	Dec 2019	-		-		-	0.000	941.857	-
GPS IIIF Technical Mission Analysis	MIPR	Various : Various	0.750	8.384	Dec 2018	6.701	Dec 2019	-		-		-	0.000	15.835	-
GPS IIIF Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	6.026	13.414	Dec 2018	12.107	Dec 2019	-		-		-	0.000	31.547	-
		Subtotal	196.169	370.824		422.246		-		-		-	0.000	989.239	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 IIIF Test and Evaluation	Various	Various : Various	0.000	1.140	Mar 2019	2.053	Mar 2020	-		-		-	0.000	3.193	-
		Subtotal	0.000	1.140		2.053		-		-		-	0.000	3.193	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 IIIF FFRDC	MIPR	Aerospace Corp : El Segundo, CA	1.100	5.736	Dec 2018	4.478	Dec 2019	-		-		-	0.000	11.314	-
GPS IIIF A&AS	Various	Various : El Segundo, CA	5.230	34.102	Jan 2019	18.448	Dec 2019	-		-		-	0.000	57.780	-
GPS IIIF Other Support	Various	Various : El Segundo, CA	0.261	0.400	Oct 2018	0.650	Oct 2019	-		-		-	0.000	1.311	-
		Subtotal	6.591	40.238		23.576		-		-		-	0.000	70.405	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	202.760	412.202		447.875		-		-		-	0.000	1,062.837	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 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. However, unlike many traditional R&D programs, the GPS IIIF R&D and Production phases fall under a Fixed Price Incentive Firm Target (FPIF) contract type with progress payments. 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 2021 Air Force		Date: February 2020
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*

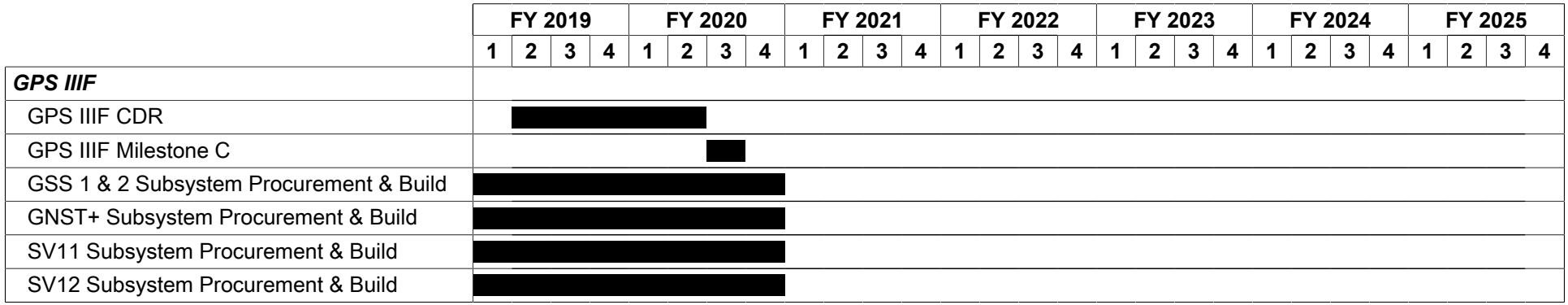

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 5	**R-1 Program Element (Number/Name)** PE 1203269F / *GPS III Follow-On (GPS IIIF)*	**Project (Number/Name)** 653170 / *GPS IIIF*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
GPS IIIF				
GPS IIIF CDR	2	2019	2	2020
GPS IIIF Milestone C	3	2020	3	2020
GSS 1 & 2 Subsystem Procurement & Build	1	2019	4	2020
GNST+ Subsystem Procurement & Build	1	2019	4	2020
SV11 Subsystem Procurement & Build	1	2019	4	2020
SV12 Subsystem Procurement & Build	1	2019	4	2020