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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3620F: Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206447SF I Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	0.000	408.527	538.208	0.000	538.208	362.250	364.429	1,221.011	1,054.977	Continuing	Continuing
657MEO: Resilient MW/MT - MEO	-	0.000	408.527	538.208	0.000	538.208	362.250	364.429	1,221.011	1,054.977	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 The FY 2023 enacted budget transferred all FY 2023 ground funding from PE 1206448SF - Resilient Missile Warning Missile Tracking (MW/MT) - Integrated Ground Segment, to three separate PEs including (1) PE 1206446SF - Resilient Missile Warning Tracking - Low Earth Orbit (LEO), (2) Space Development Agency (SDA) Launch PE 1203954SF, and (3) PE 1206447SF - Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO). In the FY 2024 budget submission, funds for MEO and LEO ground system activities are included within PE 1206448SF.

A. Mission Description and Budget Item Justification

The United States Space Force (USSF) Space Systems Command (SSC) and Space Development Agency (SDA) are collaborating to deliver Overhead Persistent Infrared (OPIR) capabilities, in concert with Department of Defense (DoD) and Intelligence Community (IC) partners, to support a proliferated space architecture, resilient-by-design, capable of operating through contested environments. SSC's Resilient MW/MT - MEO space and ground efforts pivot the Department of the Air Force's (DAF) legacy missile warning force design to a more resilient multi-orbit approach to counter advanced missiles, hypersonic glide vehicles, and fractional orbital bombardment threats. MW/MT - MEO is anchored in Missile Warning and Missile Defense Capability Development Document (CDD) requirements validated by the Joint Requirements Oversight Council (JROC). Constellation resiliency is foundational to the DAF's Resilient Missile Warning / Tracking force design; therefore, the OPIR Family of Systems, including MW/MT - MEO, is designed to work cohesively to gain and maintain custody of a spectrum of missile threats.

The MEO program will deploy space assets in multiple epochs to allow for incremental capability delivery and to ensure competition throughout the lifecycle of the program. Resilient MW/MT - MEO will bolster legacy Space Based Infrared Satellite (SBIRS) and Next-Gen OPIR capabilities and will independently satisfy all mission area CDD requirements for both missile warning and tracking by FY 2031. FY 2024 funding supports space segment long-lead parts purchases, space vehicle bus and main mission payload assembly, integration and test, and early on-orbit initialization studies for up to three (3) vendors to support the first Epoch 1 launch in FY 2026.

Using a Combined Program Office (CPO) construct, SSC, SDA, and the Missile Defense Agency (MDA) are teaming to develop and implement a system-of-systems integration strategy across for MW/MT/MD constellations supporting LEO, MEO, and GEO/Polar orbit regimes. Resilient MW/MT - MEO Epoch 1 is comprised of multiple space and ground lines of effort to include following space items:

- Space vehicle development efforts are currently underway with two (2) vendors [Raytheon (RTN) and Millennium Space Systems (MSS)] with contract options currently in place to deliver six (6) space vehicles. An additional three (3) space vehicles are required to close the MSS solution. With a congressional add in FY 2023, the program office is accelerating by placing an additional three (3) space vehicles on contract by 4Q FY 2023.

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- Delivery of nine (9) total space vehicles [three (3) Raytheon and six (6) Millennium] includes: design, build, hardware integration, testing, delivery, launch vehicle integration, space vehicle launch & early orbit operations, calibration, tuning, flying, and delivery of formatted two-dimensional tracks into the Real-Time Transfer Service (RTS) for incorporation with other sensors data necessary for warning/tracking requirements and operations.
- FY 2023 congressional add allows for contract award for a third vendor previously identified in the original Epoch 1 source selection. Award decision for additional Epoch 1 spacecraft, beyond the nine (9) planned, is scheduled to occur NET September 4Q FY 2023 to one of three (3) potential vendors based on performance to-date. To support this plus up, the PEO directed 10M in additional funds to accelerate Epoch 1 FY 2023 developments.

Space acquisition teams must respond with speed and agility to emerging adversary threats. SSC has transformed 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, SSC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose existing capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MW/MT capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	0.000	139.131	267.358	0.000	267.358
Current President's Budget	0.000	408.527	538.208	0.000	538.208
Total Adjustments	0.000	269.396	270.850	0.000	270.850
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-21.200			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	130.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	160.596	270.850	0.000	270.850

Change Summary Explanation

FY 2023: +160.596M; transfer funding and effort for the MEO Ground Segment portion of shared PE 1206448SF, Project 657124, to PE 1206447SF, Resilient Missile Warning Missile Tracking, Resilient MW/MT - MEO Project 657MEO to centralize Missile Warning Missile Tracking activities and improve transparency.

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FY 2023: +130.000M; Congressional Add for Epoch 1 acceleration and Vendor risk reduction.

FY 2023: -21.200M; MEO ground inadequate justification.

FY 2024: +148.517M; transfer funding and effort for the MEO Missile Tracking Demonstration portion of PE 1206442SF, Next Generation OPIR, Space Mod Initiative Project 657009 to PE 1206447SF, Resilient Missile Warning Missile Tracking, Resilient MW/MT - MEO Project 657MEO to centralize Missile Warning Missile Tracking activities and improve transparency.

FY 2024: +137.350M; realigned procurement funds from MW/MT to support Epoch 1 development and test activities.

FY 2024: -1.757M; to realign funding to APPN 3410, PE 1207804SF (SAG 13C), for fiscal policy compliance as Space Systems Command (SSC) establishes Headquarters functions and a Chief Information Office (CIO) for integrated cybersecurity.

FY 2024: +2.480M; inflation raises for non-pay & non-fuel purchases.

FY 2024: -15.740M; realigns funds to PE 1206448SF to support MW/MT to Full Operational Capability (FOC).

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2022	FY 2023	FY 2024
<p>Title: Missile Warning / Missile Tracking - MEO Space and Ground</p> <p>Description: Transitions the MEO Track Custody Demonstration (MTCD) under PE 1206442SF Next Generation OPIR, Space Modernization Initiative (Project 657009) from digital engineering to a future program of record. This activity funds development of MEO satellites, with two launches planned to deliver up to nine satellites by FY 2027, and ground efforts with operations necessary to deliver Initial Warfighting Capability (IWC) for the combined LEO and MEO architecture. IWC consists of regional tracking, mission management and control, and coordinated regional warning and access validated through on-orbit measurements. After performance validation is complete, prototype sensors will feed data directly to operational warning and defense systems. Furthermore, IWC will provide sensitivity to detect emerging threats, accurate tracking to contain maneuvering targets, and mission data delivery within required latency timelines to close the kill-chain. With additional congressional FY 2023 funding, the program is aggressively pursuing additional space capability beyond the first nine satellites for up to another plane of capability with the most mature design of the three vendor Epoch 1 baseline.</p> <p>FY 2023 Plans: Space Activities: Further efforts initiated in PE 1206442SF to rapidly transition the MTCD from a single satellite sensor demonstration to a multiple satellite coordinated prototype effort tied to a cross-linked initial warfighting capability of the future architecture. In coordination with funds in 1206442SF Next Generation OPIR Budget Program Accounting Code 657009, this program element will begin</p>	-	408.527	538.208

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>development of SVs 2 and beyond with plans to achieve a multiple orbital plane prototype. FY 2023 begins long lead purchases of flight parts to take two or more designs from payload critical design review through system Critical Design Review (CDR). Additionally, it begins crosslink development, communication system upgrades, and full spacecraft development to expand beyond a single demonstration to a multi-satellite, multi-plane prototype. Finally, bus integration and test begins after completion of system CDR. 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, experimentation, prototyping, etc.</p> <p>With the \$130M congressional add, Epoch 1 vendors will receive additional funding to transition quickly from CDR into additional spacecraft production, and a third vendor was added to the Epoch 1 competition with work planned to mature their payload design and provide initial models. Additionally, the program added \$10M to Vendor 2 SV 4-6 to expedite production of the full second Epoch 1 plane.</p> <p>Ground Activities (included in FY 2023 due to shared space/ground PE): This program element expands development for Command and Control (C2) and Mission Data Processing (MDP) to meet the initial warfighter capability for sensitivity, accuracy, and latency of the MW/MT MEO space layer. This includes investments in facilities, hardware, ground transport, Ground Entry Points (GEP), contract services, and any other general ground infrastructure required to standup an instantiation of the FORGE Mission Data Processing Application Framework (MDPAF) for MDP and establish appropriate C2 solutions. Leverage and expand upon existing Mission Data Processing Applications (MDPAPs) and Joint OPIR Ground initiatives to ensure rapid processing and dissemination to global warfighting community. In addition, this effort will support the planning and execution of performance and integration risk mitigation activities associated with C2 challenges, MDP expansion, and interagency integration. 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, experimentation, prototyping, etc.</p> <p>FY 2024 Plans: The Space Vehicle CDRs kicks off FY 2024 efforts as the program finalizes two designs. Execute design, development, and integration of a MEO MW/MT constellation from two current vendors. Conduct Space Vehicle and System Critical Design Reviews and proceed to payload and bus build, integration, and test activities. Additionally, FY 2024 activities mature and finalize the crosslink design, communication system, and bus subsystems. Furthermore, completion of long lead spacecraft purchases and establishment of test equipment infrastructure, lab, and clean room processing is planned to support multi-vehicle test assembly. The program will continue to execute and build off of digital models and process workflow established in prior years under the track custody demonstration effort and conduct technical operations in a digital cloud-based ecosystem to host structural, functional, and performance models. Activities may include, but are not limited to, program office support, studies, technical</p>				

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
analysis, experimentation, prototyping, etc. Finally, FY 2024 activities are planned to include payload critical design review for a third vendor with all associated model deliveries and hardware/software ground demonstrations.			
The program plans to continue acquisition of additional Epoch 1 spacecraft with acceleration funds for up to another plane of capability. Also, to support up to a third plane of Epoch 1 spacecraft, the program added additional acceleration funds in FY 2024 to supplement the Congressional add and aggressively pursue additional Epoch 1 capabilities to address adversary hypersonic threats. The program office is allowing each solution to mature and the competition to continue until selecting a vendor for additional spacecraft development.			
FY 2023 to FY 2024 Increase/Decrease Statement: FY 2024 increased to execute MEO spacecraft and constellation design, build and test activities for two (2) vendors and nine (9) space vehicles.			
Accomplishments/Planned Programs Subtotals	-	408.527	538.208

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• 1206442SF: <i>Next Generation OPIR</i>	-	97.770	-	-	-	-	-	-	-	-	Continuing
• 1206448SF: <i>Resilient Missile Warning Missile Tracking - Integrated Ground Segment</i>	-	-	252.784	-	252.784	280.234	291.495	287.930	267.962	Continuing	Continuing

Remarks

E. Acquisition Strategy
The Resilient MW/MT - MEO initiative began in FY 2019 as Next Gen OPIR "Block 1 Prototype" under the Next Gen OPIR Space Modernization Initiative (SMI) PE1206442SF. Six (6) missile track custody prototype contracts were competitively awarded under this effort which utilized a multi-phased contracting strategy to field an on-orbit "Missile Track Custody Demonstration" or the MTCD space vehicle. Early efforts also included digital engineering risk reduction which serves as the foundation for current Resilient MW/MT- MEO efforts.

In FY 2021, following the completion of the Space Warfighting Analysis Center (SWAC) force design for the Missile Warning / Missile Tracking mission area, MTCD efforts were formalized as Resilient MW/MT - MEO Epoch 1. May 2021 Epoch 1 contract awards were the result of a free, fair, and open competition where Five (5) vendors submitted proposals and Two (2) were selected to develop the first Six (6) vehicles fielded NLT FY 2027 as Resilient MW/MT - MEO Epoch 1. The Full Missile Warning / Missile Defense OPIR Capability Development Document (CDD) and Technical Requirements Document (TRD) included in the Request for Proposal (RFP).

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Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3620F: <i>Research, Development, Test & Evaluation, Space Force I BA 5: System Development & Demonstration (SDD)</i>	PE 1206447SF / <i>Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)</i>

The Space Force will continue field capability under current contracts competitively awarded for the first three (3) vehicles from each contractor (Space Vehicles 1-6). In May 2022, the SFPEO for Space Sensing approved an acquisition strategy for all of Epoch 1 scope: Vehicles 1-6; additional vehicles to meet performance baseline (at least 3); command and control software; mission data processing software; operations and integration; and at least Two (2) Ground Entry Points (six total ground antennas) for command & telemetry.

In January 2023, the SFPEO for Space Sensing approved the acquisition strategy for Epoch 1 satellites 7-9 [Millennium Space Systems' delivery of an additional Three (3) space vehicles - SV's 4-6]. The program is developing the full acquisition strategy for all of Epoch 1 and targeting summer of 2023 to formally transition to a program of record. The strategy will include acceleration of additional spacecraft as part of the congressional plus up. The Epoch 1 requirements are derived from the Missile Warning and Missile Defense OPIR Enterprise CDD, validated by the JROC in May 2019. Epoch 1 serves as the first delivery of capability targeting polar warning and regional tracking coverage with launches in late calendar year 2026. Future epochs are planned for competitive awards and a follow-on acquisition strategy still in development. The acquisition strategy for the space and mission-unique ground portions of Epoch 1 was approved by the SFPEO for Space Sensing in May 2022.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force **Date:** March 2023

Appropriation/Budget Activity 3620F / 5	R-1 Program Element (Number/Name) PE 1206447SF / <i>Resilient Missile Warning Missile Tracking - Medium Earth Orbit (MEO)</i>	Project (Number/Name) 657MEO / <i>Resilient MW/MT - MEO</i>
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Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MW/MT MEO Epoch 1, Vendor 1 SV 1-3	C/CPIF	Raytheon : El Segundo, CA	-	-		105.814	Dec 2022	197.840	Dec 2023	-		197.840	Continuing	Continuing	-
MW/MT MEO Epoch 1, Vendor 2 SV 1-3	C/Various	Millennium Space Systems : El Segundo, CA	-	-		77.481	Mar 2023	64.380	Dec 2023	-		64.380	Continuing	Continuing	-
MW/MT MEO Epoch 1, Vendor 2 SV 4-6	C/CPIF	Millennium Space Systems : El Segundo, CA	-	-		-		109.860	Dec 2023	-		109.860	Continuing	Continuing	-
MWMT MEO Epoch 1, Acceleration Vendor 1 SV 1-3	C/CPIF	Raytheon : El Segundo, CA	-	-		60.000	Sep 2023	-		-		-	Continuing	Continuing	-
MWMT MEO Epoch 1, Acceleration Vendor 2 SV 1-3	C/CPIF	Millennium Space Systems : El Segundo, CA	-	-		20.000	Sep 2023	-		-		-	Continuing	Continuing	-
MWMT Acceleration Epoch 1, Vendor 2 SV 4-6	C/CPIF	Millennium Space Systems : El Segundo, CA	-	-		30.000	Aug 2023	-		-		-	Continuing	Continuing	-
MW/MT MEO Epoch 1, Vendor 3	TBD	TBD : TBD	-	-		30.000	May 2023	-		-		-	Continuing	Continuing	-
MW/MT MEO Epoch 1 Acceleration	C/FP	TBD : TBD	-	-		-		147.547	Dec 2023	-		147.547	Continuing	Continuing	-
MW/MT MEO Ground Entry Point (GEP)	MIPR	Northrop Grumman : Fairfax, VA	-	-		51.000	Mar 2023	-		-		-	Continuing	Continuing	-
MW/MT MEO Operations & Integration (O&I)	TBD	TBD : TBD	-	-		7.000	Mar 2023	-		-		-	Continuing	Continuing	-
MW/MT MEO Data Fusion	TBD	TBD : TBD	-	-		3.400	Mar 2023	-		-		-	Continuing	Continuing	-
Enterprise SE&I	Various	Various : TBD	-	-		4.900	Dec 2022	2.524	Dec 2023	-		2.524	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace : El Segundo, CA	-	-		2.608	Dec 2022	1.343	Jan 2024	-		1.343	Continuing	Continuing	-
Subtotal			-	-		392.203		523.494		-		523.494	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force **Date:** March 2023

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Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	RO	Aerospace Corp. : El Segundo, CA	-	-		6.302	Jan 2023	3.245	Jan 2024	-		3.245	Continuing	Continuing	-
A&AS	Various	Various : TBD	-	-		9.822	Nov 2022	11.269	Nov 2023	-		11.269	Continuing	Continuing	-
Other Support	Various	Various : TBD	-	-		0.200	Nov 2022	0.200	Nov 2023	-		0.200	Continuing	Continuing	-
Subtotal			-	-		16.324		14.714		-		14.714	Continuing	Continuing	N/A
Project Cost Totals			-	-		408.527		538.208		-		538.208	Continuing	Continuing	N/A

Remarks

FY23 Notes:
 -MEO Epoch 1 Vendor 1 47.000M to be funded out of SMI (PE 1206442SF, BPAC 657009) in 2023 for a total value of 212.816M.
 -MEO Epoch 1 Vendor 2 38.400M to be funded out of SMI (PE 1206442SF, BPAC 657009) in 2023 for a total value of 155.902M.

FY24 Notes:
 -A&AS Cost Growth is associated with the scope of Epoch 1 growing to include an additional vendor and spacecraft. Furthermore, costs increase to support the ground program's most critical year of development for the ground antennas and ops center.

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
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	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Resilient Missile Warning/Missile Tracking - Space</i>																												
Payload Critical Design Review					■																							
Design, Production & Build of SVs					■																							
System Critical Design Review									■																			
Assembly, Integration & Test									■																			
Launch 1, Vendor 1																	■											
Launch 2, Vendor 2																					■							
On-Orbit Experimentation/Demo																					■							
<i>Resilient Missile Warning/Missile Tracking - Ground</i>																												
Mission Data Processing design, build, integration & test					■																							
Command & Control design, build, integration & test					■																							
GEP selection criteria					■																							
Initial Operating Capability for Ground Operations					■																							
Complete MEO Interim Ops Center (MIOC) Selections					■																							
GEP Contract Support					■																							
GEP site surveys complete					■																							
GEP contract award					■																							
Build and deploy GEP testbeds to contractor facilities					■																							

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
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	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

MIOC fit up: Ops room fit up, HVAC and power, furnish workstations																												
MIOC ground network infrastructure design and construction, hardware installation and check																												
GEP sites design, development, and integration and test																												
GEP site construction																												
Ground System PDR																												
Ground System CDR																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Resilient Missile Warning/Missile Tracking - Space</i>				
Payload Critical Design Review	1	2023	1	2023
Design, Production & Build of SVs	2	2023	2	2026
System Critical Design Review	4	2023	1	2024
Assembly, Integration & Test	1	2024	4	2026
Launch 1, Vendor 1	4	2026	1	2027
Launch 2, Vendor 2	1	2027	2	2027
On-Orbit Experimentation/Demo	1	2027	4	2028
<i>Resilient Missile Warning/Missile Tracking - Ground</i>				
Mission Data Processing design, build, integration & test	1	2023	4	2023
Command & Control design, build, integration & test	1	2023	4	2023
GEP selection criteria	1	2023	2	2023
Initial Operating Capability for Ground Operations	1	2023	4	2023
Complete MEO Interim Ops Center (MIOC) Selections	1	2023	2	2023
GEP Contract Support	2	2023	4	2023
GEP site surveys complete	2	2023	2	2023
GEP contract award	2	2023	2	2023
Build and deploy GEP testbeds to contractor facilities	2	2023	4	2023
MIOC fit up: Ops room fit up, HVAC and power, furnish workstations	2	2023	4	2023
MIOC ground network infrastructure design and construction, hardware installation and check	2	2023	4	2023
GEP sites design, development, and integration and test	2	2023	4	2023

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
GEP site construction	3	2023	4	2023
Ground System PDR	3	2023	3	2023
Ground System CDR	3	2023	3	2023