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 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 1206438F / *Space Control Technology*							
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	-	44.139	91.646	64.231	0.000	64.231	75.200	77.539	100.995	51.963	Continuing	Continuing
642611: *Technology Insertion Planning and Analysis*	-	44.139	91.646	64.231	0.000	64.231	75.200	77.539	100.995	51.963	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2020 and beyond, PE 1206438F, Space Control Technology, Project 642611, Technology Insertion Planning and Analysis, Experimentation Platforms efforts are transferred to PE 1206427F, Space Systems Prototype Transitions, Project 645601, in order to better align funding with related efforts.

A. Mission Description and Budget Item Justification

This project supports a range of activities including systems engineering, technology planning, development, demonstrations and prototyping, and testing, as well as modeling, simulations and exercises to support development and maturation of tactics and procedures for a responsive and resilient Space Control mission area. This includes technology development and prototyping for Defensive Counterspace (DCS) and Offensive Counterspace (OCS) and the necessary systems engineering for the warfighter to effectively employ such systems.

Specifically supported are DCS and Space Situational Awareness (SSA) activities which include developing threat warning payloads for monitoring, detecting, identifying, tracking, assessing, verifying, categorizing, and characterizing objects and events in space. Additionally, this activity supports the development of payload prototypes and space defense force packages for protecting U.S. space systems, resources, and operations from enemy attempts to negate, interfere, or destroy them.

Specific OCS activities include disruption, denial, or degradation (and associated Electronic Support) of adversary space systems which may be used for purposes hostile to U.S. national security interests. Rapid Reaction Capabilities in response to immediate warfighter needs in the Space Control mission area are developed within this program.

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

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 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 1206438F / *Space Control Technology*

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 effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	7.842	92.118	82.252	0.000	82.252
Current President's Budget	44.139	91.646	64.231	0.000	64.231
Total Adjustments	36.297	-0.472	-18.021	0.000	-18.021
• Congressional General Reductions	0.000	-0.472			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	30.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.503	0.000			
• Other Adjustments	7.800	0.000	-18.021	0.000	-18.021

Change Summary Explanation

FY 2018: $30.000M Congressional increase for Space Defense Force Packaging; $7.8M OCO funding

FY 2020: $18.021M decrease for Experimentation Platforms transfer to dedicated PE 1206427F, Space Systems Prototype Transitions.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Rapid Reaction Branch	15.642	25.656	21.612
Description: Develops advanced capabilities for rapid prototyping and integration into space control programs of record and, if requested, to warfighter Urgent Operational Needs (UONs) and Joint Urgent Operational Needs (JUONs). Conducts prototyping, demonstration, testing, and rapid transition of technology and techniques to space control systems.			
FY 2019 Plans: Develop, test, and field enhancements for a fielded prototype-capability in USCENTCOM. Test and field second increment of operationalized prototype for USINDOPACOM. Field prototype capability to fulfill emergent USAFRICOM requirement. Develop and test enhancements to two prototypes that were transitioned to a program-of-record in FY 2017. Complete integration and test			

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 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 1206438F / *Space Control Technology*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
of a technology prototype for a program-of-record. Continue program office support and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc. FY 2019 OCO supports pre-planned product improvements and version upgrades of advanced capabilities deployed to two locations in support of Operation Inherent Resolve ***FY 2020 Plans:*** Develop, test, train, field, transition and sustain advanced rapid reaction capabilities in response to emergent requirements from multiple Combatant Commands. Conduct initial technical development and integration activities against relevant threat systems and technologies in preparation for operational requirements. Develop and test advanced prototypes in support of activities within the Space Control Technology portfolio. Integrate and evaluate relevant GRA Increment 4 technologies. Integrate information assurance constructs and controls into developmental platforms to expedite fielding. Execute field development & test activities, at CONUS & OCONUS locations, to verify system performance in the operational environment. Enhance fielded rapid reaction capabilities in response to evolving threats and operator feedback. 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. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2020 decreased compared to FY 2019 by $4.044M. Justification for this decrease is described in the plans above.			
Title: Experimentation Platforms & Defense Force Packaging	28.497	65.990	42.619
Description: This effort will acquire, outfit and operate microsat busses with the primary purpose of demonstrating new technologies, flight testing payloads or subsystems, and validating Tactics, Techniques, and Procedures (TTPs) to ensure the delivery of critical space effects throughout all phases of a future space conflict against an adaptive and thinking adversary. It also supports a range of activities developing, prototyping, and fielding a family of on-board and near-board, modular resilience payloads supporting threat warning and protection options for National Security Space High-Value satellites. These payloads will be integrated with enterprise command and control capabilities for tasking, reporting, and response. On-orbit prototype demonstrations will be performed to demonstrate sensor/payload capabilities for high-value satellite force packaging requirements. Systems Engineering will enable the integration, interoperability and compatibility of new space control technology systems and capabilities amongst each other and amongst these new systems and the existing space control enterprise. ***FY 2019 Plans:*** Acquire two non-developmental microsat satellites to be flown on a Long Duration Propulsive ESPA platform, available Space Test Program mission or other ridesharing opportunity. Procure and/or integrate experimental payloads or sensors on microsat busses and/or operational assets. Plan and execute microsat on-orbit flight experiments; collect, process, distribute and analyze			

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 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 1206438F / *Space Control Technology*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
payload/sensor data; and evaluate the military utility of coalition air, land, sea and space assets against known and projected threats/scenarios in order to prioritize current and future capability gaps and vulnerabilities. Initiate development of selected sensor/response payloads (from mod/sim and analysis efforts) for prototype demonstrations for threat warning and response payloads for high-value satellites. Initiate prototype and operations ground infrastructure design trades and build-out in support space control C2 and space range requirements. Perform risk reduction efforts to define high-value satellite bus requirements for force packaging on-ramps. Define enterprise interfaces and standards with System-of-Systems Model-Based Engineering, and modeling and simulation to determine critical paths and nodes, timing requirements, risks, and opportunities. Define developmental and operational test plans to ensure system performance in contested space and cyber domains. 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:*** Continue development of selected sensor/response payloads (from mod/sim and analysis efforts) for prototype demonstrations for threat warning and response payloads for high-value satellites. Continue prototype and operations ground infrastructure design trades and build-out in support space control C2 and space range requirements. Perform risk reduction efforts to define high-value satellite bus requirements for force packaging on-ramps. Create and mature systems engineering models for space control scenarios and consolidate separate program artifacts into an interconnected virtual representation of the SY enterprise. Exercise those models to determine critical paths and nodes, timing requirements, risks, and opportunities. Define various systems engineering functions, tools, procedures, and best practices to accelerate acquisition of successful and affordable space systems. Perform systems engineering support tasks. Perform maturation and transition of new technology, and technology needs identification, prioritization, and solution development. 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. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2020 decreased compared to FY 2019 by $23.371M. Justification for this decrease is described in the plans above, including an $18.021M transfer to PE 1206427F.			
Accomplishments/Planned Programs Subtotals	44.139	91.646	64.231

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 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 1206438F / *Space Control Technology*

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible. SCT program consists of numerous small projects. Space Defense Force Packaging and Experimentation Platforms initiative consists of several interrelated activities that require close coordination and integration, which may reduce the opportunities for independent competitive contracting actions.

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 / 4	**R-1 Program Element (Number/Name)** PE 1206438F / *Space Control Technology*	**Project (Number/Name)** 642611 / *Technology Insertion Planning and Analysis*

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
SCT Counterspace Technology Prototyping/ Rapid Reaction Development	Various	Various : Various	-	6.605	Jan 2018	22.888	Jan 2019	20.092	Oct 2019	-		20.092	Continuing	Continuing	-
SCT Technical Mission Analysis	RO	Aerospace : El Segundo, CA	-	0.730	Oct 2017	-		-		-		-	Continuing	Continuing	-
SCT Foundational Architecture	C/FFP	TBD : El Segundo, CA	-	-		8.804	Feb 2019	8.319	Oct 2019	-		8.319	Continuing	Continuing	-
SCT Experimentation Platforms Sensors	C/CPIF	Various : Various, CA	-	-		5.900	Jan 2019	-		-		-	Continuing	Continuing	-
SCT Experimentation Platforms Microsat Buses	C/FFP	Various : Various, CA	-	-		10.800	Jan 2019	-		-		-	Continuing	Continuing	-
SCT Modeling & Sim; Payload Analysis and Alternatives	C/Various	Various : Various, CA	-	13.000	Dec 2018	12.043	May 2019	6.500	Oct 2019	-		6.500	Continuing	Continuing	-
SCT OCO Funding P3I	Various	Various : Various	-	7.800	Jul 2018	1.100	Jan 2019	-		-		-	Continuing	Continuing	-
SCT Sensor Prototype Development	C/Various	Various : Various, CA	-	15.497	Jan 2019	23.320	Feb 2019	24.300	Oct 2019	-		24.300	Continuing	Continuing	-
SCT Ground Infrastructure	Various	Various : Various, CA	-	-		0.500	Oct 2018	2.500	Oct 2019	-		2.500	Continuing	Continuing	-
SCT High-Value Satellite Bus Requirements	Various	Various : Various, CA	-	-		1.500	Feb 2019	1.000	Oct 2019	-		1.000	Continuing	Continuing	-
		Subtotal	-	43.632		86.855		62.711		-		62.711	Continuing	Continuing	N/A

Remarks

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force		Date: February 2019
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Support ($ 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
Civilian Reimbursable Budget Authority	Various	Space and Missile Systems Center : El Segundo, CA	-	-		0.180	Oct 2018	-		-		-	Continuing	Continuing	-
		Subtotal	-	-		0.180		-		-		-	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
A&AS	Various	Various : Various, CA	-	0.507	Jan 2018	3.311	Feb 2019	1.520	Jan 2020	-		1.520	Continuing	Continuing	-
FFRDC	Various	Various : Various, CA	-	-		1.000	Oct 2018	-		-		-	Continuing	Continuing	-
Other Support	Various	Various : Various, CA	-	-		0.300	Oct 2018	-		-		-	Continuing	Continuing	-
		Subtotal	-	0.507		4.611		1.520		-		1.520	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	-	44.139		91.646		64.231		-		64.231	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 1206438F / *Space Control Technology*	**Project (Number/Name)** 642611 / *Technology Insertion Planning and Analysis*

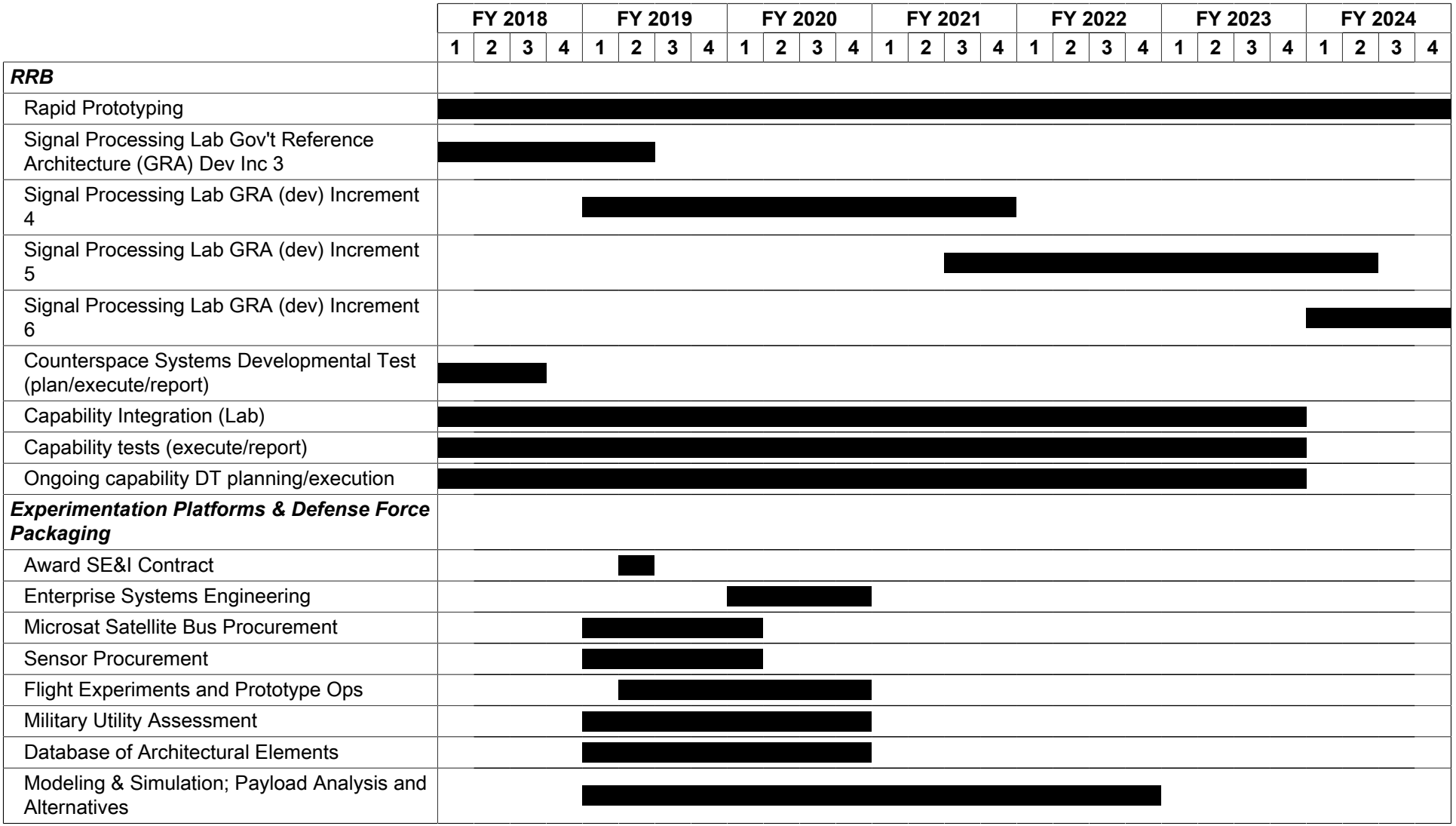

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 1206438F / *Space Control Technology*	**Project (Number/Name)** 642611 / *Technology Insertion Planning and Analysis*

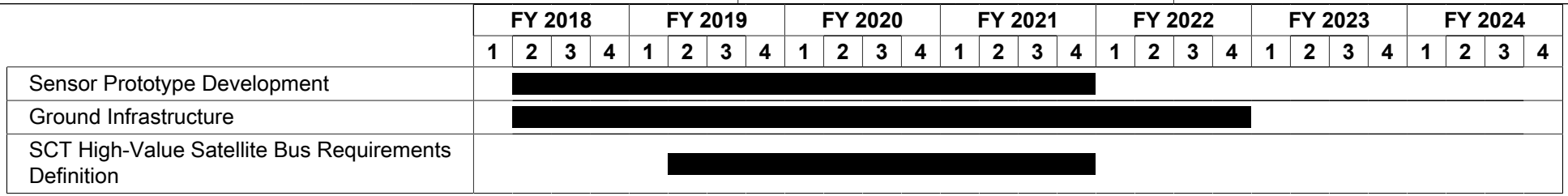

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 1206438F / *Space Control Technology*	**Project (Number/Name)** 642611 / *Technology Insertion Planning and Analysis*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
RRB				
Rapid Prototyping	1	2018	4	2024
Signal Processing Lab Gov't Reference Architecture (GRA) Dev Inc 3	1	2018	2	2019
Signal Processing Lab GRA (dev) Increment 4	1	2019	4	2021
Signal Processing Lab GRA (dev) Increment 5	3	2021	2	2024
Signal Processing Lab GRA (dev) Increment 6	1	2024	4	2024
Counterspace Systems Developmental Test (plan/execute/report)	1	2018	3	2018
Capability Integration (Lab)	1	2018	4	2023
Capability tests (execute/report)	1	2018	4	2023
Ongoing capability DT planning/execution	1	2018	4	2023
Experimentation Platforms & Defense Force Packaging				
Award SE&I Contract	2	2019	2	2019
Enterprise Systems Engineering	1	2020	4	2020
Microsat Satellite Bus Procurement	1	2019	1	2020
Sensor Procurement	1	2019	1	2020
Flight Experiments and Prototype Ops	2	2019	4	2020
Military Utility Assessment	1	2019	4	2020
Database of Architectural Elements	1	2019	4	2020
Modeling & Simulation; Payload Analysis and Alternatives	1	2019	4	2022
Sensor Prototype Development	2	2018	4	2021
Ground Infrastructure	2	2018	4	2022
SCT High-Value Satellite Bus Requirements Definition	2	2019	4	2021