Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force											Date: May 2021	
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 0604257F / *Advanced Technology and Sensors*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	23.145	24.702	23.745	0.000	23.745	-	-	-	-	-	-
644818: *Imaging and Targeting Support*	-	16.987	15.869	14.641	0.000	14.641	-	-	-	-	-	-
645148: *Common Airborne Sense and Avoid (C-ABSAA)*	-	6.158	8.833	9.104	0.000	9.104	-	-	-	-	-	-

Note

In FY2022, PE 0604257F (Advanced Technology and Sensors), Project 645148, (Common Airborne Sense and Avoid) funds were transferred to align funding with Air Force project priorities and requirements.

A. Mission Description and Budget Item Justification

The Advanced Technology and Sensors (ATS) program coordinates the development of advanced technologies (sensors, data links, targeting support, and quick reaction capabilities) in support of multiple airborne reconnaissance platforms, both manned and unmanned. Its objectives are to develop, demonstrate, and rapidly transition advanced, interoperable, multi-platform solutions to reduce the find, fix, target, and track kill chain timeline, and to provide safe separation and collision avoidance for remotely piloted aircraft. This program coordinates the development of common collection, processing, and dissemination solutions for near-real time intelligence, surveillance, and reconnaissance. The ATS program also increases interoperability by developing common standards and interfaces.

The funds in this program are distributed in priority order for the goal of building a comprehensive Geospatial Intelligence (GEOINT) capability for the USAF. On an annual basis, developmental technologies are reviewed against warfighter capabilities and requirements based on strategic roadmaps and on the results of the Airborne Sensors for ISR Analysis of Alternatives, as prefaced in the Challenging Targets Initial Capabilities Document. Efforts advancing the technological maturity of promising sensors and processing capabilities are reviewed and prioritized into a recommended list for senior executive direction to implement in the coming year. The program office has the ability to rapidly initiate an Imaging & Targeting Support (I&TS) project in order to expedite development and acquisition of urgently needed capabilities for the warfighter.

The Air Force is pursuing a software intensive approach to maintain safe separation, avoid collisions, and provide the ability to safely integrate with other airspace users. The software solutions identified in this Information System Capability Development Document (IS-CDD) are open and modular and accept inputs from any type of sensor or data link and will operate any legacy and future Group 4 and 5 RPA. The effort includes technology maturation, risk reduction, EMD and life-cycle costs, such as: 1) prototyping activities, 2) streamlined development, test and implementation of the software, 3) development of open system architecture using modular design, standards-based interfaces, and widely-supported consensus-based standards, and 4) collaboration with the Federal Aviation Agency (FAA), National Aeronautics and Space Administration (NASA), and other services to develop national policy and standards.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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 0604257F / *Advanced Technology and Sensors*

Funds in any project can also cover activities to include studies and analysis to support both current program planning and execution and future program planning. This program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	23.145	24.747	60.729	0.000	60.729
Current President's Budget	23.145	24.702	23.745	0.000	23.745
Total Adjustments	0.000	-0.045	-36.984	0.000	-36.984
• 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	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	-0.045	-36.984	0.000	-36.984

Change Summary Explanation

In FY 2022, BPAC 645148, decrease of $35.371M, funds reallocated for higher Air Force priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / *Advanced Technology and Sensors*	Project (Number/Name) 644818 / *Imaging and Targeting Support*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
644818: *Imaging and Targeting Support*	-	16.987	15.869	14.641	0.000	14.641	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The purpose of the I&TS project is to develop, mature, demonstrate, and rapidly transition next-generation, persistent, wide area surveillance and common imagery reconnaissance sensor capabilities (active and passive systems), including sensor data processing, for multiple airborne platforms, as well as sensor products to aid in rapid targeting (e.g., geolocation models, sensor-based exploitation tools, sensor networking capabilities).

Developmental efforts pursued include improved sensor performance, new and improved sensor capabilities and modes, new and/or unique modalities, and enabling technologies. Improved sensor performance includes but is not limited to: increased geolocation accuracy, increased dismount detection capability, and advanced sensor data correlation. New and improved sensor capabilities include but are not limited to: Hyperspectral Imagery (HSI), Polarimetric Imaging (PI), Ground and Dismount Moving target indicator (GMTI/ DMTI), maritime search/track, Inverse Synthetic Aperture Radar, Foliage Penetration (FOPEN), and nuclear event detection. New and improved sensor modes include but are not limited to: high resolution imagery, Ground and Dismount Moving Target Indicator (GMTI/DMTI), persistent surveillance, wide area motion imagery, and Spectral Identification. New and unique sensor modalities include but are not limited to: low frequency SAR, Hyperspectral Imagery (HSI), and Light Detection And Ranging (LIDAR). Enabling Technologies include but are not limited to: automated and assisted target detection/recognition, Artificial Intelligence (AI), Machine Learning (ML), network centric warfare, integrated multi-sensor capabilities to detect and identify obscured targets, TCPED (Tasking, Collection, Planning, Exploitation, and Dissemination) improvements related to sensors, automated registration, and imagery product quality assurance.

These efforts are intended to accelerate delivery of data from sensor to user for both target search and target engagement (kill-chain) activities. This project will also increase interoperability by developing and advancing common standards (e.g. Open Mission Systems (OMS), Sensor Open System Architecture (SOSA), Common Open Architecture Radar Programs (COARPS), Multi-INT Common Open Architecture Reconnaissance Program Standard (MI-COARPS), National Imagery Transmission Format, AgilePod and data reduction) and interfaces.

Activities also include studies and analysis to support both current program planning and execution and future program planning. This program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Imaging & Targeting Support (I&TS)	16.987	15.869	14.641

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604257F / *Advanced Technology and Sensors*	**Project (Number/Name)** 644818 / *Imaging and Targeting Support*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: Corporately prioritized Air Force Multi-INT Portfolio of projects to develop and demonstrate next generation airborne sensors and processing technologies to further the art of the possible and/or transition ISR capabilities (ex: radar improvement, next-generation HSI, LIDAR, ISR Standards, EO/IR, and data mitigation technologies). ***FY 2021 Plans:*** Continue to develop, modernize, and demonstrate lower TRL projects into transition ready efforts. The following FY20 efforts will continue into FY21: − Common Open Architecture Radar Programs (COARPs) Compliant Detection Removal and Characterization (DRACO) − Automated imagery exploitation (EO Deep Learning) − Aether Spy − Multi-INT ATR for Geospatial Intelligence Capabilities (MAGIC) These efforts and following new and other projects approved through the GEOINT Capabilities Working Group (GCWG) Executive Element process. - Multi-INT Object-level Targeting Imagery Fusion-engine (MOTIF) - Autonomous Multi-IMINT Adaptive Tasking Engine (AUTOMATE) - H-Chip Mid Altitude Risk Reduction - MI-COARPS Processor for Real-Time Embedded Performance (MICPREP) - Real Time Turbulence Mitigation ***FY 2022 Plans:*** Will continue to develop, modernize, and demonstrate lower TRL projects into transition ready efforts. The following FY21 efforts will continue into FY22: - Multi-INT Object-level Targeting Imagery Fusion-engine (MOTIF) - Autonomous Multi-IMINT Adaptive Tasking Engine (AUTOMATE) - MI-COARPS Processor for Real-Time Embedded Performance (MICPREP) - Real Time Turbulence Mitigation These efforts and new proposed projects will be approved through the GEOINT Capabilities Working Group (GCWG) Executive Element process. Efforts are approved in the summer prior to the start of the new fiscal year. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease of funding from FY2021 to FY2022 to support higher Air Force priorities.			
Accomplishments/Planned Programs Subtotals	16.987	15.869	14.641

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604257F / *Advanced Technology and Sensors*	**Project (Number/Name)** 644818 / *Imaging and Targeting Support*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Imaging and Targeting Support efforts are prioritized on an annual basis by the GCWG, in accordance with the validated gaps in the Challenging Targets Initial Capabilities Document. Resulting funded efforts are then contracted for and/or executed by either various program offices, laboratories, industry, and/or other government agencies.

Acquisition strategy is to maximize commercial and national development efforts and investment through multiple contracting methods, including the use of Engineering Change Proposals to modify existing contracts and new contracts that were awarded both competitively or on a sole source basis.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / *Advanced Technology and Sensors*	Project (Number/Name) 644818 / *Imaging and Targeting Support*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SHERLOC	SS/CPFF	Collins : Westford, MA	-	0.691	Jul 2020	0.018	May 2021	-		-		-	-	-	-
H-Chip	SS/CPFF	EO Vista : Acton, MA	-	2.944	Apr 2020	1.895	Dec 2020	-		-		-	-	-	-
Predator/Reaper Off-board Sensing and Improved Targeting (PROSIT)	SS/CPFF	Various : Various, OH	-	0.854	Feb 2020	0.047	May 2021	-		-		-	-	-	-
AgilePOD	SS/CPFF	Various : Various	-	3.347	Aug 2020	4.222	May 2021	-		-		-	-	-	-
Multi-ATR	SS/CPFF	BAE : Durham, NC	-	2.040	Feb 2020	-		-		-		-	-	-	-
COARPS Compliant Detection Removal and Characterization (DRACO)	SS/CPFF	Lockheed Martin : Goodyear, AZ	-	1.250	Jun 2020	1.199	Jun 2021	-		-		-	-	-	-
Automated Electro-Optical Mobile Target Classification Deep Learning	SS/CPFF	Ball Aerospace : Dayton, OH	-	1.800	Jun 2020	2.640	Feb 2021	-		-		-	-	-	-
Aether Spy	SS/CPFF	Various : Various	-	2.845	Apr 2020	-		-		-		-	-	-	-
Cerberus	SS/CPFF	Raytheon : McKinney, TX	-	0.394	Mar 2020	-		-		-		-	-	-	-
KeyRadar	SS/CPFF	Jacobs Technology : Beavercreek, OH	-	0.350	Jun 2020	-		-		-		-	-	-	-
MOTIF	SS/CPFF	SRI : Ann Arbor, MN	-	-		1.300	Jan 2021	0.902	Dec 2021	-		0.902	-	-	-
Real Time Turbulence Mitigation	SS/CPFF	Centauri : Chantilly, VA	-	-		0.580	Feb 2021	0.850	Dec 2021	-		0.850	-	-	-
AUTOMATE	SS/CPFF	SRI : Ann Arbor, MN	-	-		0.800	Mar 2021	0.629	Dec 2021	-		0.629	-	-	-
MICPREP	SS/CPFF	General Dynamics : Bloomington, MN	-	-		1.950	Jan 2021	1.950	Dec 2021	-		1.950	-	-	-
New FY22 Technology Efforts (Prioritized by GCWG)	Various	Various : Various	-	-		-		8.509	Jan 2022	-		8.509	-	-	-
		Subtotal	-	16.515		14.651		12.840		-		12.840	-	-	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604257F / *Advanced Technology and Sensors*	**Project (Number/Name)** 644818 / *Imaging and Targeting Support*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PMA: Other Govt Cost	Various	Various : Dayton, OH	-	0.472	Nov 2019	1.218	Nov 2020	1.801	Nov 2021	-		1.801	-	-	-
		Subtotal	-	0.472		1.218		1.801		-		1.801	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	16.987		15.869		14.641		-		14.641	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604257F / *Advanced Technology and Sensors*	**Project (Number/Name)** 644818 / *Imaging and Targeting Support*

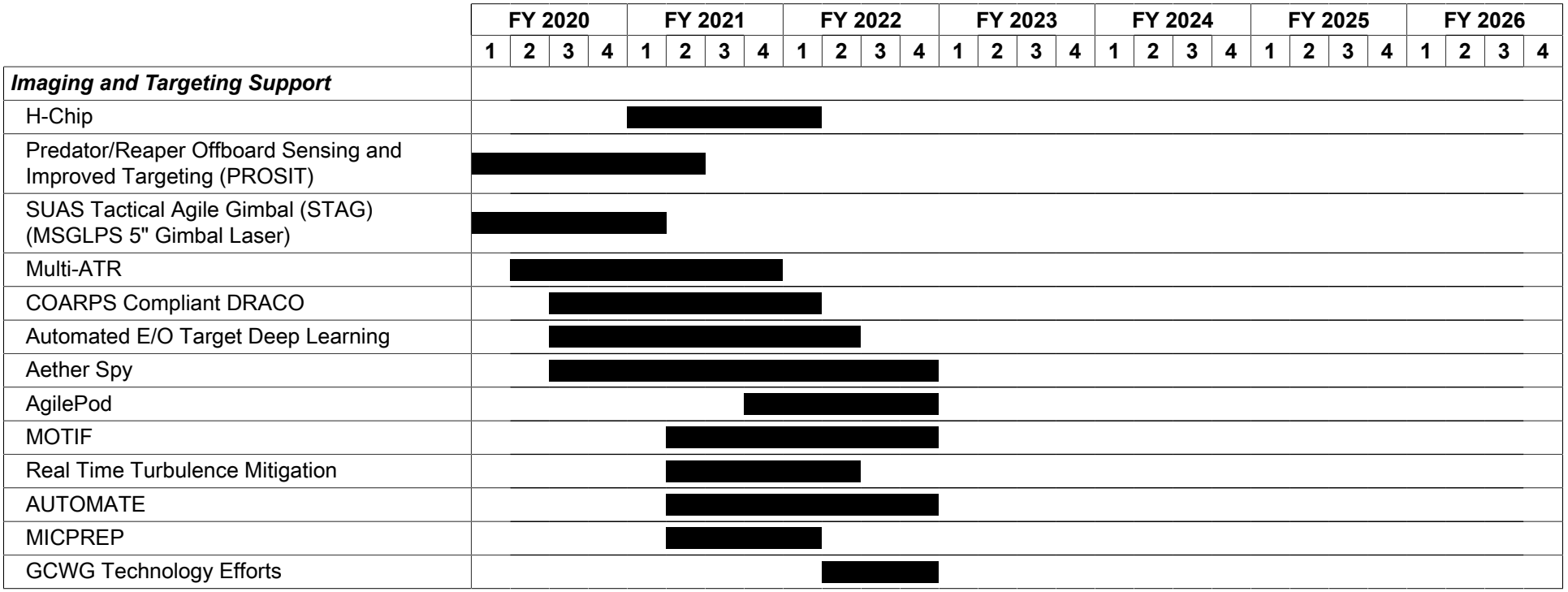

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604257F / *Advanced Technology and Sensors*	**Project (Number/Name)** 644818 / *Imaging and Targeting Support*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Imaging and Targeting Support				
H-Chip	1	2021	1	2022
Predator/Reaper Offboard Sensing and Improved Targeting (PROSIT)	1	2020	2	2021
SUAS Tactical Agile Gimbal (STAG) (MSGLPS 5" Gimbal Laser)	1	2020	1	2021
Multi-ATR	2	2020	4	2021
COARPS Compliant DRACO	3	2020	1	2022
Automated E/O Target Deep Learning	3	2020	2	2022
Aether Spy	3	2020	4	2022
AgilePod	4	2021	4	2022
MOTIF	2	2021	4	2022
Real Time Turbulence Mitigation	2	2021	2	2022
AUTOMATE	2	2021	4	2022
MICPREP	2	2021	1	2022
GCWG Technology Efforts	2	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / *Advanced Technology and Sensors*	Project (Number/Name) 645148 / *Common Airborne Sense and Avoid (C-ABSAA)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
645148: *Common Airborne Sense and Avoid (C-ABSAA)*	-	6.158	8.833	9.104	0.000	9.104	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Common-Airborne Sense and Avoid (C-ABSAA) project provides Group 4 and 5 Remotely Piloted Aircraft (RPA) with the ability to safely and effectively operate in all classes of airspace worldwide. The C-ABSAA project acts as a replacement for the sense and avoid capability of the pilot on board a manned aircraft.

The Air Force is pursuing a software intensive approach to maintain safe separation, avoid collisions, and provide the ability to safely integrate with other airspace users. The software solutions identified in this Information System Capability Development Document (IS-CDD) are open and modular and accept inputs from any type of sensor or data link and will operate any legacy and future Group 4 and 5 RPA. The effort includes technology maturation, risk reduction, and software processes and initiatives, such as: 1) prototyping activities, 2) system integration, test and implementation of software, 3) development of open system architecture using modular design, standards-based interfaces, and widely-supported consensus-based standards, 4) development of model based system engineering processes, standards and documentation and, 5) collaboration with the Federal Aviation Agency (FAA), National Aeronautics and Space Administration (NASA), and other services to develop national policy and standards.

The program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Sense and Avoid (SAA)-Related Activities	6.158	8.833	9.104
Description: Conduct risk reduction and prototyping activities to improve affordability, reduce cost, schedule and technical risk entering next milestone. Received Joint Staff approval of Information Systems CDD requirements. C-ABSAA uses an iterative and incremental approach to design, code, integrate, test and implement high quality software in a cost effective and timely manner. The software utilizes Open System Architecture (OSA) design, COTS, Application Programming Interfaces (APIs), and maximum software and interface module independence. Program will also develop and certify Government simulation tools and equipment. ***FY 2021 Plans:*** - Completion of RPA sense and avoid (C-ABSAA) Technology Maturation & Risk Reduction phase - Generate and complete technical data package			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604257F / *Advanced Technology and Sensors*	**Project (Number/Name)** 645148 / *Common Airborne Sense and Avoid (C-ABSAA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
- Generate documentation requiremented for Milestone B - Collaborate with FAA, NASA, and other Services and agencies on national policy and standards - Develop, test, and certify within C-ABSAA Systems Integration Lab open modular architecture processes, standards and design ***FY 2022 Plans:*** FY 2022 Plans: - Will complete and close remaining C-ABSAA Technology Maturation & Risk Reduction actions to posture for future efforts - Will complete review and acceptance of Technical Data Package - Will allocate remaining funds to expedite existing projects or start new projects within the Advanced Technology & Sensors program under the Imaging and Targeting Support project ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase to support follow-on C-ABSAA Technology Maturation & Risk Reduction Phase and continued collaboration.			
Accomplishments/Planned Programs Subtotals	6.158	8.833	9.104

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Contract will be competitively awarded.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / *Advanced Technology and Sensors*	Project (Number/Name) 645148 / *Common Airborne Sense and Avoid (C-ABSAA)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
C-ABSAA Technology Development	C/Various	Various : Various	-	2.406	Oct 2019	4.113	Nov 2020	4.104	Dec 2021	-		4.104	-	-	-
		Subtotal	-	2.406		4.113		4.104		-		4.104	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Administration (PMA)	Various	Various : Various	-	3.752	Oct 2019	4.720	Oct 2020	5.000	Dec 2021	-		5.000	-	-	-
		Subtotal	-	3.752		4.720		5.000		-		5.000	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	6.158		8.833		9.104		-		9.104	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604257F / *Advanced Technology and Sensors*	**Project (Number/Name)** 645148 / *Common Airborne Sense and Avoid (C-ABSAA)*

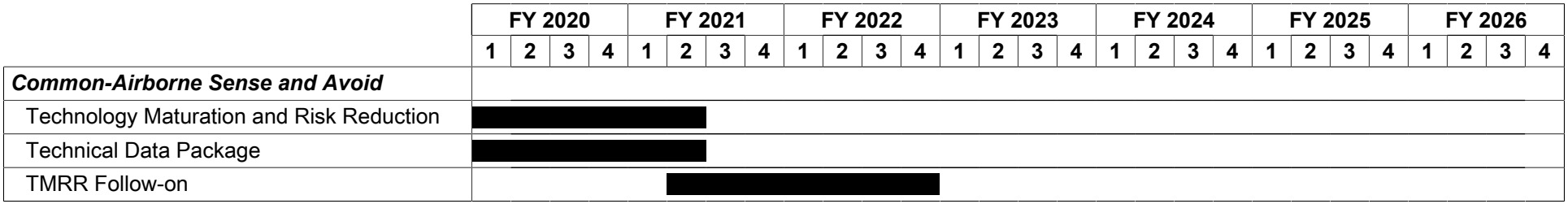

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	**R-1 Program Element (Number/Name)** PE 0604257F / *Advanced Technology and Sensors*	**Project (Number/Name)** 645148 / *Common Airborne Sense and Avoid (C-ABSAA)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Common-Airborne Sense and Avoid				
Technology Maturation and Risk Reduction	1	2020	2	2021
Technical Data Package	1	2020	2	2021
TMRR Follow-on	2	2021	4	2022