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 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*							
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	0.000	105.088	127.296	162.080	0.000	162.080	168.160	171.688	42.917	43.706	1,116.995	1,937.930
675212: *MQ-9 SLAM*	0.000	0.000	6.290	71.802	0.000	71.802	76.714	119.463	8.771	8.932	194.031	486.003
675246: *MQ-9 Development and Fielding*	0.000	28.244	50.931	32.334	0.000	32.334	32.956	33.546	34.146	34.774	0.000	246.931
675247: *Squadron Operations Centers (SOC)*	0.000	5.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.752
675249: *MQ-9 Upgrade*	0.000	71.092	70.075	57.944	0.000	57.944	58.490	18.679	0.000	0.000	922.964	1,199.244
Program MDAP/MAIS Code: 424												

A. Mission Description and Budget Item Justification

The basic MQ-9 Reaper system consists of the aircraft, sensors, Ground Control Station (GCS), communications equipment, weapon kits, support equipment, simulator and training devices, Readiness Spares Packages (RSP), technical data/training, and personnel required to operate, maintain, and sustain the system. The system is designed to be modular and open-ended. Mission-specific equipment is employed in a plug-and-play mission kit concept allowing specific aircraft and GCS configurations to be tailored to fit mission needs.

The MQ-9 Reaper system has four separate development programs. This PE includes:
1. MQ-9 System Lifecycle Agile Modernization (SLAM). This effort is to develop improvements for existing systems and to field new capabilities for the baseline MQ-9 fleet using an Agile Acquisition Strategy to include concept exploration for an MQ-9 follow-on.
2. MQ-9 Development and Fielding. This effort is for development and fielding of the baseline MQ-9 aircraft and GCSs and associated communications systems, sensors, payloads, simulators, support equipment, and resolving Diminishing Manufacturing Sources (DMS) issues.
3. Squadron Operations Centers (SOC). This effort is for development and fielding of standardized operations centers. SOCs contain the equipment necessary for remote split operations, to provide mission data and tasking information to aircrew, and to disseminate and/or exchange mission data with decision-makers and the intelligence community.
4. MQ-9 Upgrade. This effort is to develop improvements for existing systems and to field new capabilities for the baseline MQ-9 fleet using an Agile Acquisition Strategy.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

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 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*			
B. Program Change Summary ($ in Millions)	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**
Previous President's Budget	108.845	154.996	236.000	0.000	236.000
Current President's Budget	105.088	127.296	162.080	0.000	162.080
Total Adjustments	-3.757	-27.700	-73.920	0.000	-73.920
• 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	-3.757	-27.700	-73.920	0.000	-73.920

Change Summary Explanation

FY20 Base

- $27.7M reduction identified by FY20 Appropriations Bill Line 176, Page 290 as "Upgrade program excess to need."

FY21 Base

- $73.920M reduction accounts for prior year funds that are currently available to execute in this funding period.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*	Project (Number/Name) 675212 / *MQ-9 SLAM*	

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
675212: *MQ-9 SLAM*	0.000	0.000	6.290	71.802	0.000	71.802	76.714	119.463	8.771	8.932	194.031	486.003
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MQ-9 System Lifecycle Agile Modernization (SLAM) Program develops and integrates improvements for existing systems and fields new capabilities for the MQ-9 fleet through an Agile Acquisition Strategy to meet evolving mission needs. SLAM includes concept exploration for MQ-9 follow-on effort.

The objective is to enable rapid fielding of new software, hardware, and sustainability for integration into the MQ-9 fleet with requirements from the Candidate Capability List (CCL) that may include, but are not limited to, efforts to reduce system configurations; perform technology upgrades; increase pilot awareness and usability; improve reconnaissance targeting and exploitation; expand weapons system selection and lethality; enlarge suitability to varying operational theaters; improve security and self-protection; reduce logistics footprint; train the warfighter, and prototype.

Activities also include, but are not limited to, studies, analysis, simulations, demonstrations, prototyping and testing, use of subject matter experts agencies to develop and test MQ-9 system capabilities and follow-on which include, but are not limited to System Integration Laboratory (SIL)/ Hardware in the Loop Laboratory (HILL) and Detachment 3 (Det 3) improvements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

Funding may be used to address Diminishing Manufacturing Source (DMS) and Non-Recurring Engineering issues.

Where appropriate, the MQ-9 Program of Record (PoR) and Air Force Special Operations Command (AFSOC) will cost share on joint efforts that are required by both programs to support new capabilities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: MQ-9 SLAM	0.000	6.191	67.987
Description: Develops and integrates upgrade capabilities to support of the MQ-9 modernization strategy. Development combines the rigor of an event driven development process (referred to as Technology Maturation Effort (TME)) with the expedited delivery of a schedule driven integration and fielding process. New capabilities include, but are not be limited to, upgrades of existing aircraft, Ground Control Station (GCS), communication, payload systems, and software updates. MQ-9 SLAM also addresses and resolves Diminishing Manufacturing Sources (DMS) issues.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675212 / *MQ-9 SLAM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Candidate Capabilities are determined by Major Commands (ACC, AFSOC) direction and inputs that included Joint Urgent Operational Need (JUON) and Urgent Operational Need (UON) requests. Approval of software/hardware content was established in FY 2018 based on current operational priorities. Activities also include, but are not limited to, operator simulators, reliability and maintainability, test support, communications, and urgent services. During development MQ-9 PoR and AFSOC will cost share on joint efforts that are required by both programs to support the new capabilities. ***FY 2020 Plans:*** Begin TME developing upgrade capabilities in conjunction with the CCL to include, but not limited to: • Weapons usability improvements • Unified Tactical Situational Awareness • Mode 5 • Ku or Global Positioning System (GPS) jamming; data encryption, Identification Friend or Foe (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability, (e.g.,developmental testing, software updates, documentation and training) ***FY 2021 Plans:*** Continue TME developing upgrade capabilities in conjunction with the CCL to include, but are not limited to: • Weapons usability improvements • Unified Tactical Situational Awareness • Mode 5 • Ku or Global Positioning System (GPS) jamming; data encryption, Identification Friend or Foe (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability, (e.g.,developmental testing, software updates, documentation and training) ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased as MQ-9 SLAM continues to ramp up.			
Title: Reliability and Maintainability ***Description:*** Develops MQ-9 Reliability and Maintainability (R&M) improvements for aircraft and ground base infrastructure. Includes engineering change orders, studies, and general research. Addresses and resolves DMS issues. Funding was approved for this R&M effort in the FY20 appropriation--this effort is not a New Start.	0.000	0.000	1.763

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675212 / *MQ-9 SLAM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
FY 2020 Plans: Begin development of aircraft and ground base infrastructure to improve mission capable rates and reduce reliability and maintainability costs. Includes addressing and resolving DMS issues. ***FY 2021 Plans:*** Continue development of aircraft and ground base infrastructure to improve mission capable rates and reduce reliability and maintainability costs. Includes addressing and resolving DMS issues. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased as MQ-9 SLAM Reliability and Maintainability continues to ramp up.			
Title: Test Support ***Description:*** Provides support for, but is not limited to, activities for MQ-9 testing of weapon system hardware/software testing in accordance with (IAW) contract standards, developmental testing of new capabilities, and R&M upgrades. ***FY 2020 Plans:*** Provides government agencies support for MQ-9 testing to include continued acceptance testing of weapon system hardware/ software IAW with contract standards, developmental testing of new capabilities, and R&M improvements. ***FY 2021 Plans:*** Continues to provide government agencies support for MQ-9 testing to include continued acceptance testing of weapon system hardware/software IAW with contract standards, developmental testing of new capabilities, and R&M improvements. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased due to MQ-9 SLAM continuing to ramp up weapon system hardware/software testing.	0.000	0.088	1.298
Title: Communications ***Description:*** Develops MQ-9 communications capabilities such as, but not limited to, network systems managers, SATCOM, and relay site capability upgrades. Includes drafting technical orders and support documentation, training materials, production drawings, and retrofit acceptance plans (e.g., Bandwidth Efficient Common Data Link (BE-CDL) Secure Voice Multi Level Security (MLS), ARC-210 Guard Squelch and Secure Communications). ***FY 2020 Plans:*** Develops communications capabilities to enable improved encrypted data links, terminal, command and control, ISR transmission, GCS communications, SATCOM, integrate IP-based network interfaces, primary data links, network system managers, operational durability, remote split operations, support equipment. Also includes associated technical orders and flight manuals. ***FY 2021 Plans:***	0.000	0.011	0.502

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675212 / *MQ-9 SLAM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Continue to develop communications capabilities to enable improved encrypted data links, terminal, command and control, ISR transmission, GCS communications, SATCOM usage, integrate IP-based network interfaces, primary data links, network system managers, operational durability, remote split operations, support equipment. Also includes associated technical orders and flight manuals ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased as MQ-9 SLAM Communications continues to ramp up.			
Title: Concept Exploration for follow-on to MQ-9 ***Description:*** Includes but is not limited to, program planning for the follow-on MQ-9 effort which explores capabilities in a contested environment. ***FY 2021 Plans:*** Development activities, which include but are not limited to, studies, analysis, and prototyping RPA operations in a contested environment. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase from FY 2020 to FY 2021 due to MQ-9 SLAM concept exploration for MQ-9 follow-on effort in first year of execution in FY 2021.	-	-	0.252
Accomplishments/Planned Programs Subtotals	0.000	6.290	71.802

C. 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
• APAF 06 PRDTB1: *MQ-9*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• APAF 05 PRDTB2: *MQ-9 Mods*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Remarks

PMA costs are included in Other Government Costs.

D. Acquisition Strategy

Acquisition of MQ-9 SLAM is accomplished via sole-source contracts with General Atomics-ASI, Raytheon, and L-3 Communications, prime contractors, and United States Government (USG) Labs. Management of development and fielding of new capabilities will be through an Agile Acquisition Strategy that combines the rigor of an event driven development process (referred to as a Technology Maturation Effort (TME)) with the expedited delivery of a schedule driven integration and fielding process. This will allow continued baseline improvements while rapidly integrating limited urgent needs.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*	Project (Number/Name) 675212 / *MQ-9 SLAM*	

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
Product Development	C/CPAF	Not Specified: TBD : TBD	0.000	-		-		-		-		-	0.000	0.000	-
MQ-9 SLAM	SS/CPAF	GA-ASI : Poway, CA	0.000	-		5.972	Jul 2020	65.961	Nov 2020	-		65.961	179.783	251.716	-
Reliability and Maintainability	SS/CPAF	GA-ASI : Poway, CA	0.000	-		-		1.763	Apr 2021	-		1.763	5.719	7.482	-
Communications	SS/CPAF	GA-ASI : Poway, CA	0.000	-		0.011	Jul 2020	0.502	Jan 2021	-		0.502	1.629	2.142	-
Concept Exploration for follow-on to MQ-9	Various	Various : Various	0.000	-		-		0.252	Jul 2021	-		0.252	0.267	0.519	-
		Subtotal	0.000	-		5.983		68.478		-		68.478	187.398	261.859	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
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Test Support	Various	Various : Various	0.000	-		0.088	Jul 2020	1.298	Nov 2020	-		1.298	2.742	4.128	-
		Subtotal	0.000	-		0.088		1.298		-		1.298	2.742	4.128	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
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	0.000	-		0.219	Jul 2020	2.026	Apr 2021	-		2.026	11.135	13.380	-
		Subtotal	0.000	-		0.219		2.026		-		2.026	11.135	13.380	N/A

	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
Project Cost Totals	0.000	-		6.290		71.802		-		71.802	201.275	279.367	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675212 / *MQ-9 SLAM*

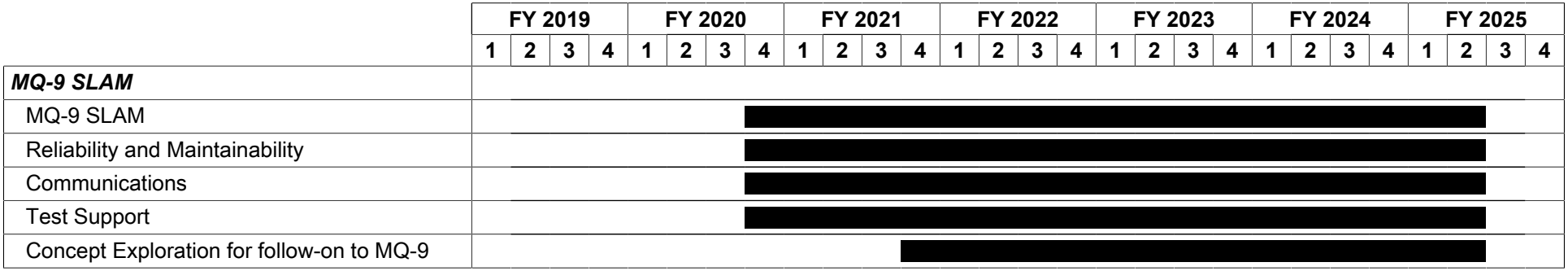

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675212 / *MQ-9 SLAM*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MQ-9 SLAM				
MQ-9 SLAM	4	2020	2	2025
Reliability and Maintainability	4	2020	2	2025
Communications	4	2020	2	2025
Test Support	4	2020	2	2025
Concept Exploration for follow-on to MQ-9	4	2021	2	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*	Project (Number/Name) 675246 / *MQ-9 Development and Fielding*	

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
675246: *MQ-9 Development and Fielding*	0.000	28.244	50.931	32.334	0.000	32.334	32.956	33.546	34.146	34.774	0.000	246.931
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Quantity of RDT&E Articles refers only to test aircraft.

A. Mission Description and Budget Item Justification

The basic MQ-9 Reaper system consists of the aircraft, sensors, Ground Control Station (GCS), communications equipment, weapon kits, support equipment, simulator and training devices, Readiness Spares Packages (RSP), technical data/training, and personnel required to operate, maintain, and sustain the system. The system is designed to be modular and open-ended. Mission-specific equipment is employed in a plug-and-play mission kit concept allowing specific aircraft and GCS configurations to be tailored to fit mission needs.

The MQ-9 Reaper aircraft is a single-engine, turbo-prop Remotely Piloted Aircraft (RPA) designed to operate over-the-horizon at medium-to-high altitude for long endurance sorties. The aircraft is designed to primarily prosecute critical emerging Time-Sensitive-Targets (TSTs) using a Synthetic Aperture Radar (SAR), Electro-optical/Infrared (EO/IR), and laser designator-based attack asset with on-board hard-kill weapon capability (hunter-killer). It also performs Intelligence, Surveillance, Reconnaissance, and Target Acquisition (ISR TA).

The MQ-9 system is continuing to develop and field capabilities to meet evolving mission needs through incremental upgrades, including but not limited to, increasing the maximum gross takeoff and landing weight; increasing operational range and endurance; propulsion system improvements; integrated redundant avionics; incorporating provisions for a Foreign Military Sales (FMS) exportable version of the weapon system; communications upgrades to include but not limited to datalink encryption, Internet Protocol (IP) networking, secure voice and data communications; navigation system upgrades; electrical system upgrades; sensor/stores management computer improvement; MIL STD-1760 advanced weapons data bus; advanced sensor and weapon payloads; improved human-machine interface (HMI); software updates needed to support new configurations and development; integrating additional precision weapons; and hardware and software upgrades to the GCS. The program will also complete airworthiness and weapon system certification and accreditation; produce applicable training for payloads funded in other program elements (e.g. SIGINT, communications, Wide Area Motion Imagery (WAMI), Near Vertical Direction Finding (NVDF), Gorgon Stare Quick Reaction Capability, advanced Counter-Improvised Explosive Device (C-IED), missile defense, hyperspectral, and other sensors and weapons). Development efforts will address reliability, maintainability, sustainability, Diminishing Manufacturing Sources (DMS), and safety issues. Activities also include, but are not limited to, trade studies, analyses, preliminary systems engineering, system and subsystem level testing in accordance with DoD and military standards, and specification development in support of both current program planning and execution, and studies supporting analysis and investment in future MQ-9 program planning.

The GCS functions as the aircraft cockpit and can control the aircraft either within Line-of-Sight (LOS) or Beyond Line-of-Sight (BLOS) via a combination of satellite relay and terrestrial communication architectures. The GCS is either mobile to support forward operating locations or fixed at a facility to support reach back Remote Split Operations (RSO). The GCS has the capability to perform mission planning; provide a means for manual control; and enable personnel to launch, recover, and monitor

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

aircraft, payloads, and system communications status. It incorporates secure data links to send aircraft and payload commands and receive system telemetry and payload data; monitors threats to the aircraft; displays the common operational picture; and provides support functions. Launch and Recovery GCS (LRGCS) is used for servicing, systems checks, maintenance, launch and recovery of aircraft under LOS control for hand-off to a mobile or fixed facility GCS, and conducting operations within LOS range of the LRGCS. GCS upgrades will be developed and fielded in coordination with improvements to other MQ-9 system capabilities and in response to evolving operational and information assurance/certification and accreditation requirements.

This project will also increase interoperability among developed systems by developing common standards and tools.

MQ-9 Program of Record (PoR) and Air Force Special Operations Command (AFSOC) will cost share during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.

Funding may be used to address DMS and Non-Recurring Engineering (NRE) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Ground Control Station (GCS) Development	14.181	21.755	4.234
Description: Develop GCS capabilities. Major capabilities include, but are not limited to, flight payload separation, open system architecture, processors, multi-level security, ergonomic cockpit design, single seat operations, reducing or eliminating known deficiencies in legacy GCS, and updates to facilitate single software. ***FY 2020 Plans:*** Will continue GCS design/development, manufacturing and testing to include, but not limited to: • Hardware/Software Development • Integration and test • Continue GCS Development Test assets • Continue Contractor test build • Maintenance evaluation team event • Military Flight Release • Resolution of DMS issues • Field Service Representative (FSR) support during IOT&E • Block 30 Articulating Arm			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
• Block 30 Monitor • Processor(s) ***FY 2021 Plans:*** Will continue GCS design/development, manufacturing and testing to include, but not limited to: • Hardware/Software Development • Integration and test • Continue GCS Development Test assets • Continue Contractor test build • Maintenance evaluation team event • Military Flight Release • Resolution of DMS issues • Field Service Representative (FSR) support during IOT&E • Block 30 Articulating Arm • Block 30 Monitor • Processor(s) ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased due to support the Block 30 monitor, articulating arm, and Linux processor hardware, GCS development efforts, and software updates ramp up.			
Title: Operator Simulator ***Description:*** Develop Operator Simulators for training, updates to keep Operator Simulators concurrent with the aircraft and GCS to include Joint Urgent Operational Need (JUON) support emerging AFSOC configurations. MQ-9 PoR and AFSOC will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities. ***FY 2020 Plans:*** Will continue to implement updates which will keep the Operator Simulator current with the aircraft and GCS including, but not limited to: • Sensors • Databases • Weapons upgrades • Resolution of DMS issues ***FY 2021 Plans:*** Will continue to implement updates which will keep the Operator Simulator current with the aircraft and GCS including, but not limited to:	1.436	1.925	1.459

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
• Sensors • Databases • Weapons upgrades • Resolution of DMS issues ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreased as the Operator Simulator development efforts continue under the MQ-9 ACATII programs.			
Title: Release 1 and Release 2 ***Description:*** Release 1 and Release 2 continue execution of a subset of work previously performed under the System Developmemt and Demonstration (SDD) effort, while rapidly integrating upgrades or improvements (including limited urgent needs) fleet-wide. Development will combine the rigor of an event driven development process (referred to as a Technology Maturation Effort (TME)) with the expeditious delivery of a schedule driven integration and fielding process (referred to as a Release). These efforts may include, but are not limited to: Cryptographic Core Module (CCM), MTS-B Integration, Ground Control Station (GCS), Internet Protocol (IP) Migration, Synthetic Aperture Radar (SAR) Development, Extended Range, Station 1 & 7, Enablers Development, Multi Transit Ops, weapons integration, and testing on MQ-9 platform for capabilities such as rockets, missiles, bombs, guns and direct energy weapons, as well as software development required to support new capabilities. MQ-9 PoR and AFSOC will cost share during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities. ***FY 2020 Plans:*** Develop and integrate the software and data to update the MQ-9 Block 5 UAS capabilities including, but not limited to: • Resolution of DMS issues • Cryptographic Core Module (CCM) • KU Ground Data Terminals (KU GDT) • KU Line of Sight Operating System (KLOSOS) • System supportability analysis • Evaluation of design code software ***FY 2021 Plans:*** Continue developing and integrating the software and data to update the MQ-9 Block 5 UAS capabilities including, but not limited to: • Resolution of DMS issues • Cryptographic Core Module (CCM) • KU Ground Data Terminals (KU GDT)	-	8.166	9.786

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
• KU Line of Sight Operating System (KLOSOS) • System supportability analysis • Evaluation of design code software ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increase to support Cryptographic Core Module (CCM), KU Ground Data Terminals (KU GDT), and KU Line of Sight Operating System (KLOSOS)			
Title: Test Support ***Description:*** Provides Other Government Agency support for MQ-9 testing to include, but not limited to, continued acceptance testing of weapon system hardware and software in accordance with contract standards, developmental testing of new capabilities, and Reliability and Maintainability (R&M) upgrades. MQ-9 PoR and Air Force Special Operations Command (AFSOC) will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities. ***FY 2020 Plans:*** Will continue test support. ***FY 2021 Plans:*** Will continue test support. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased as the Test Support development efforts continue to support GCS and software updates to include but not limited to LoS data links, ATLC, and open system architecture.	0.143	0.137	0.316
Title: Communications ***Description:*** Develop MQ-9 communications capabilities including, but not limited to, encrypted and improved LoS data links to ROVER/Video Data Link terminals (VORTEX/Airborne Platform Video Data Link), Bandwidth Efficient (BE) Common Data Link (CDL) for Command and Control (C2) and ISR transmission to GCS, improved (including BE) Beyond LOS (BLOS) military Satellite Communications (SATCOM) usage, control module, and secure triple link modem. Development and integration of an IP-based remote split operations (RSO) network/infrastructure to include: Improvements to Ground Data Terminals (GDT), Design, development, and test of IP-based network interfaces, Improved Predator Primary Data Link (PPDL) capabilities, reduction of legacy C-band signal blockages, network systems managers, SATCOM and relay site capabilities upgrades, drafting Technical Orders (TOs) and support documentation, training materials, production drawings, and retrofit acceptance plans. MQ-9 PoR and AFSOC will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities. ***FY 2020 Plans:***	0.000	3.300	4.064

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Continue to develop and enhance MQ-9 communications capabilities, to include but not limited to, solutions of various DMS issues. ***FY 2021 Plans:*** Continue to develop and enhance MQ-9 communications capabilities, to include but not limited to, solutions of various DMS issues. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased as communications development ramps up.			
Title: MQ-9 Technology Insertion ***Description:*** Develop program protection Technology Insertion capabilities and functionality for the MQ-9 Weapon System. MQ-9 PoR and AFSOC will cost share during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities. ***FY 2020 Plans:*** MQ-9 Technology Insertion efforts will continue during FY20. ***FY 2021 Plans:*** MQ-9 Technology Insertion efforts will continue during FY20. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreased as Communications security control module effort ramps down.	12.484	15.648	12.475
Accomplishments/Planned Programs Subtotals	28.244	50.931	32.334

C. 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
• APAF 04 Line Item PRDTB1: *MQ-9*	401.603	468.600	171.899	0.000	171.899	65.052	65.565	0.000	0.000	0.000	1,172.719
• APAF 06 Line Item PRDTB1: *MQ-9 Spares*	46.522	55.943	33.128	0.000	33.128	35.142	27.652	0.000	0.000	0.000	198.387
• APAF 05 Line Item PRDTB2: *MQ-9 Mods*	167.307	90.211	58.630	0.000	58.630	30.140	11.740	11.882	12.099	0.000	382.009
• APAF 07 Line Item PRDTB1: *MQ-9*	15.291	22.107	26.585	0.000	26.585	27.127	27.612	0.000	0.000	0.000	118.722

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

C. 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

Remarks

PMA cost are included in Other Government Costs

D. Acquisition Strategy

The MQ-9 Reaper system will be acquired via sole-source contracts with General Atomics Aeronautical Systems Inc. (GA-ASI), L3Comm, and Raytheon as the prime contractors. GA-ASI is the prime contractor for aircraft and ground control stations. GA-Mission Systems (GA-MS) is the prime contractor for Lynx SAR. L3Comm is the prime contractor for the Predator Satellite Link. Raytheon is the prime contractor for the MTS-B EO/IR sensor system. Management of development and fielding of new capabilities will be through an acquisition strategy that combines the rigor of an event driven development process (referred to as a Technology Maturation Effort (TME)) with the expeditious delivery of a schedule driven integration and fielding process. This will allow continued baseline improvements while rapidly integrating limited urgent needs fleet-wide.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

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
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Ground Control Station (GCS) Development	SS/CPFF	GA-ASI : Poway, CA	0.000	25.594	Oct 2018	31.533	Mar 2020	13.990	Mar 2021	-		13.990	83.345	154.462	349.818
Multi-Spectral Targeting System (MTS)-B EO/IR Sensor	SS/CPFF	Raytheon : McKinney, TX	0.000	-		-		-		-		-	0.000	0.000	112.944
Operator Simulator	TBD	TBD : TBD	0.000	1.436	Mar 2019	1.925	Mar 2020	1.459	Mar 2021	-		1.459	3.141	7.961	56.512
Release1 and Release 2	SS/CPFF	GA-ASI : Poway, CA	0.000	0.000	Feb 2019	8.166	Feb 2020	9.786	Mar 2021	-		9.786	0.000	17.952	161.096
Communications	SS/CPFF	GA-ASI : Poway, CA	0.000	-		3.300	Nov 2019	4.064	Nov 2020	-		4.064	3.030	10.394	17.336
MQ-9 Program Protection Technology Insertion	SS/CPFF	GA-ASI : Poway, CA	0.000	0.000	Apr 2019	2.830	Apr 2020	-		-		-	0.000	2.830	58.239
Completed Efforts	SS/ Various	Various : Various	0.000	-		-		-		-		-	0.000	0.000	77.805
		Subtotal	0.000	27.030		47.754		29.299		-		29.299	89.516	193.599	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
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Test Support	Various	Various : Various, CA	0.000	0.143	May 2019	0.137	Oct 2019	0.316	Oct 2020	-		0.316	5.843	6.439	22.665
		Subtotal	0.000	0.143		0.137		0.316		-		0.316	5.843	6.439	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
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	0.000	1.071	May 2019	3.040	May 2020	2.719		-		2.719	5.446	12.276	119.924
		Subtotal	0.000	1.071		3.040		2.719		-		2.719	5.446	12.276	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*	Project (Number/Name) 675246 / *MQ-9 Development and Fielding*	

	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	0.000	28.244		50.931		32.334		-		32.334	100.805	212.314	N/A

Remarks

PMA costs are included in Other Government Costs.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

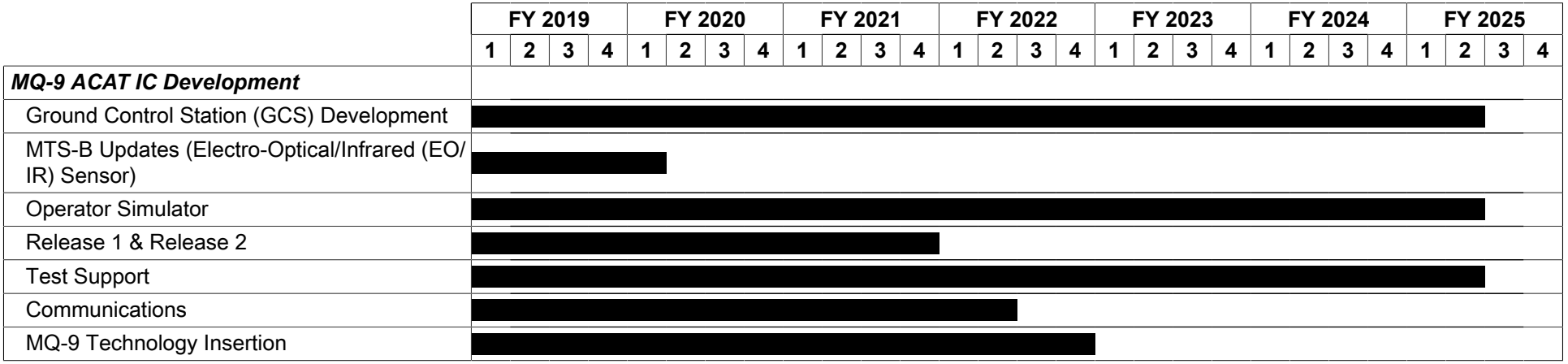

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MQ-9 ACAT IC Development				
Ground Control Station (GCS) Development	1	2019	2	2025
MTS-B Updates (Electro-Optical/Infrared (EO/IR) Sensor)	1	2019	1	2020
Operator Simulator	1	2019	2	2025
Release 1 & Release 2	1	2019	4	2021
Test Support	1	2019	2	2025
Communications	1	2019	2	2022
MQ-9 Technology Insertion	1	2019	4	2022

Note

PMA costs are included in Other Government Costs.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*	Project (Number/Name) 675247 / *Squadron Operations Centers (SOC)*	

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
675247: *Squadron Operations Centers (SOC)*	0.000	5.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.752
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The SOC is required to employ Remote Split Operations (RSO). It provides the communications, network, aircraft control and sensor distribution circuits to effectively execute RSO missions. The SOC provides CONUS-based aircrews mission data, tasking, and ability to disseminate and exchange mission data with decision-makers and intelligence entities. This effort defines component standards, develops and stands up a SOC Systems Integration Lab (SIL), and integrates new technologies to maintain currency with technological and platform advancements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system 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 2019	FY 2020	FY 2021
Title: Squadron Operations Center	5.752	0.000	0.000
Description: Development of a SOC common to Air Combat Command (ACC), Air Force Special Operations Command (AFSOC), and Air National Guard (ANG). Major capabilities include secure mission communications; data reception, recording, editing, analysis, dissemination, and exchange; mission planning, preparation, and support; mission execution (e.g., updates to threat tracking and targeting, weather tracking, mission status and capability; tactical situational awareness; etc.); and mission reconstruction and debriefing. ***FY 2020 Plans:*** No Funding ***FY 2021 Plans:*** No Funding			
Accomplishments/Planned Programs Subtotals	5.752	0.000	0.000

C. 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
• OPAF 03 Line Item 837300: *Base Communications Infrastructure*	87.378	7.898	82.160	0.000	82.160	83.212	53.749	0.000	0.000	0.000	314.397

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675247 / *Squadron Operations Centers (SOC)*

C. 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

Remarks

Since 2004, MQ-1/MQ-9 squadrons have acquired equipment, on an ad hoc basis, to provide the communications, network, aircraft control, and sensor distribution circuits needed to execute RSO missions. OPAF funding will be used to standardize and modernize existing RPA SOC capability, which is required to reduce security vulnerabilities, as well as address end of life/end of support issues of existing RPA SOC equipment. The Developmental Testing (DT) SOC will be used to further enhance the program's ability to update future RPA-SOC modernization efforts.

D. Acquisition Strategy

AFLCMC/WII manages the SOC Program for ACC, AFSOC, and ANG through organic development at the 402 SMXG, and hardware/software procurement utilizing the Air Force NETCENTS contract vehicle, as well as other Air Force and General Service Administration (GSA) contracts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675247 / *Squadron Operations Centers (SOC)*

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
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
RPA SOC Development	Various	402nd SMXG : Robins AFB, GA	0.000	5.752	Feb 2020	-		-		-		-	0.000	5.752	-
		Subtotal	0.000	5.752		-		-		-		-	0.000	5.752	N/A

	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
Project Cost Totals	0.000	5.752		0.000		-		-		-	0.000	5.752	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675247 / *Squadron Operations Centers (SOC)*

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
RPA SOC SIL																												
DT SOC Development, Procurement, and Delivery	[redacted]																											

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675247 / *Squadron Operations Centers (SOC)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
RPA SOC SIL				
DT SOC Development, Procurement, and Delivery	2	2019	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*	Project (Number/Name) 675249 / *MQ-9 Upgrade*	

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
675249: *MQ-9 Upgrade*	0.000	71.092	70.075	57.944	0.000	57.944	58.490	18.679	0.000	0.000	922.964	1,199.244
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MQ-9 Upgrade Program develops and integrates improvements for existing systems and fields new capabilities for the MQ-9 fleet through an Agile Acquisition Strategy to meet evolving mission needs.

The objective is to enable rapid fielding of new software, hardware, and sustainability for integration into the MQ-9 fleet. Per the Candidate Capability List (CCL) signed on 01 November 2019, capabilities may include, but are not limited to, efforts to reduce system configurations; mitigate Diminishing Manufacturing Sources and Material Shortages (DMSMS) through planned tech upgrades; enable airspace integration; increase weather tolerance; train like we fight; enable airborne situational awareness; enable ops in a contested environment; build open architecture, reduce logistics footprint; improve cybersecurity resilience, improve reliability and maintainability, increase lethality, improve human machine interface to enhance user experience; and improve readiness to prepare for tomorrow's war.

Activities also include studies, analysis, simulations, demonstration, prototyping, and testing, use of subject matter experts and agencies in developing and testing MQ-9 system capabilities, to include System Integration Laboratory (SIL)/ Hardware in the Loop Laboratory (HILL) and Detachment 3(Det 3) improvements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver MQ-9 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F..

Funding may be used to address Diminishing Manufacturing Source (DMS) and Non-Recurring Engineering issues.

MQ-9 Program of Record (PoR) and Air Force Special Operations Command (AFSOC) will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: MQ-9 Upgrade	67.774	61.287	45.816
Description: Develop and integrate upgrade capabilities in support of the MQ-9 Upgrade Strategy. Development will combine the rigor of an event driven development process (referred to as Technology Maturation Effort (TME)) with the expeditious delivery of a schedule driven integration and fielding process. New capabilities include, but are not limited to, upgrades of existing aircraft, Ground Control Station (GCS), communication, payload systems, Multi-Spectral Targeting System (MTS-B) and software updates needed to support new configurations and development, the addition of new capabilities and subsystems, as well as addressing and resolving DMS issues.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675249 / *MQ-9 Upgrade*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Candidate capabilities are determined by Major Command (Air Combat Command (ACC), Air Force Special Operations Command (AFSOC)) direction and inputs that included Joint Urgent Operational Need (JUON) and Urgent Operational Need (UON) requests. Approval of software/hardware content was established in FY 2018 based on current operator priorities. Activities also include, but are not limited to, operator simulators, reliability and maintainability, test support, communications, and urgent services. MQ-9 PoR and AFSOC will cost share development, where appropriate, on joint efforts that are required by both programs to support the new capabilities. ***FY 2020 Plans:*** Continue TME developing upgrade capabilities in conjunction with the CCL to include, but not limited to: • Unified Tactical Situational Awareness • Automated Takeoff and Landing Capability (ATLC) • Weapons usability improvements (i.e. auto-lockout, JAGM and four rail) • Reconnaissance, targeting and technology improvements in MTS-B, Synthetic Aperture Radar, sensors, sensor upgrades and GPS • System corrections, technology upgrades within the GCS, Unmanned Aerial Vehicle communications and ground support (i.e. batteries, engine, BE-CDL and Beyond Line of Sight (BLOS)) • Expand theater capabilities with Anti-ice/De-ice, Mode 5, ADS-B • MTS-B High-Definition Short Wave Infrared/Pulse Repetition Frequency, two-color laser system, inertial measurement unit/ autoloader • Secure Communications • Improve system security and the ability to self-protect through Ku or GPS jamming; data encryption, (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability • Gorgon Stare ***FY 2021 Plans:*** Continue TME developing upgrade capabilities in conjunction with the CCL to include, but not limited to: • Unified Tactical Situational Awareness • Design, development and integration of Moving Target Indicator (MTI) capability on medium altitude air vehicles to improve dismount and moving target detection, identification, tracking, and classification • Automated Takeoff and Landing Capability (ATLC) • Weapons usability improvements (i.e. auto-lockout, JAGM and four rail)			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675249 / *MQ-9 Upgrade*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
• Reconnaissance, targeting and technology improvements in MTS-B, Synthetic Aperture Radar, sensors, sensor upgrades and GPS • System corrections, technology upgrades within the GCS, Unmanned Aerial Vehicle communications and ground support (i.e. batteries, engine, BE-CDL and Beyond Line of Sight (BLOS)) • Expand theater capabilities with Mode 5 • MTS-B High-Definition Short Wave Infrared/Pulse Repetition Frequency, two-color laser system, inertial measurement unit/ autoloader • Secure Communications • Improve system security and the ability to self-protect through Ku or GPS jamming; data encryption, (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability • Gorgon Stare ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreased as Upgrade will continue at a decreased level as efforts under MQ-9 SLAM program (BPAC 675212) ramps up.			
Title: Operator Simulator ***Description:*** Develop Operator Simulators for training, and perform updates to keep operator simulators concurrent with the aircraft and GCS to include, but not limited to, JUONs, UONs, and support emerging AFSOC configurations. ***FY 2020 Plans:*** Continue implementing updates to keep the operator simulator current with the aircraft and GCS. ***FY 2021 Plans:*** Continue implementing updates to keep the operator simulator current with the aircraft and GCS. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased due to MQ-9 Upgrade operator simulators continue to update in order to keep concurrent with aircraft GCS configurations.	2.680	8.000	9.497
Title: Reliability and Maintainability ***Description:*** Develop MQ-9 Reliability and Maintainability (R&M) improvements for aircraft and ground base infrastructure. Includes engineering change orders and associated studies, general research, addressing and resolving DMS issues, program office support and other high level initiatives directed by the Air Force. Funding was approved for this R&M effort in the FY20 appropriation--this effort is not a New Start.	0.000	0.000	1.636

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675249 / *MQ-9 Upgrade*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
FY 2020 Plans: Continue development of aircraft and ground base infrastructure to improve mission capable rates and reduce reliability and maintainability costs, to include addressing and resolving DMS issues. ***FY 2021 Plans:*** Continue development of aircraft and ground base infrastructure to improve mission capable rates and reduce reliability and maintainability costs, to include addressing and resolving DMS issues. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding increased due to MQ-9 Upgrade continuing to ramp up Reliability and Maintainability.			
Title: Test Support ***Description:*** MQ-9 Upgrade testing provides support including, but not limited to, activities for MQ-9 testing of weapon system hardware and software IAW contract standards, developmental testing of new capabilities, and R&M upgrades. ***FY 2020 Plans:*** Continue providing government agencies support for MQ-9 testing to include continued acceptance testing of weapon system hardware and software IAW with contract standards, developmental testing of new capabilities, and R&M improvements. ***FY 2021 Plans:*** Continue providing government agencies support for MQ-9 testing to include continued acceptance testing of weapon system hardware and software IAW with contract standards, developmental testing of new capabilities, and R&M improvements. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreased as MQ-9 Upgrade Test Support will continue at a decreased level as efforts under MQ-9 SLAM (BPAC 675212) ramps up.	0.638	0.620	0.527
Title: Communications ***Description:*** Develop MQ-9 communications capabilities including, but not limited to, network systems managers, SATCOM and relay site capabilities upgrades, drafting technical orders and support documentation, training materials, production drawings, and retrofit acceptance plans (i.e., BE CDL, Secure Voice Multi-Level Security (MLS), ARC-210 Guard Squelch and Secure Communications). ***FY 2020 Plans:*** MQ-9 Upgrade communications capabilities development will continue ***FY 2021 Plans:***	0.000	0.168	0.468

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675249 / *MQ-9 Upgrade*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
MQ-9 Upgrade communications capabilities development will continue ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding decreased as MQ-9 Upgrade Communications continuing at a decreased level as efforts under MQ-9 SLAM (BPAC: 675212) ramps up.			
Accomplishments/Planned Programs Subtotals	71.092	70.075	57.944

C. 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
• APAF 06 PRDTB1: *MQ-9 UAV*	1.726	54.069	14.268	0.000	14.268	14.070	14.322	0.000	0.000	0.000	98.455
• APAF 05 PRDTB2: *MQ-9 Mods*	22.641	164.204	129.757	0.000	129.757	130.972	152.655	0.000	0.000	0.000	600.229

Remarks

PMA costs are included in Other Government Costs.

D. Acquisition Strategy

Acquisition of MQ-9 Upgrade is accomplished via sole-source contracts with General Atomics-ASI, Raytheon, and L-3 Communications, prime contractors, and Other Government Agencies. Management of development and fielding of new capabilities will be through an Agile Acquisition Strategy that combines the rigor of an event driven development process (referred to as a Technology Maturation Effort (TME)) with the expedited delivery of a schedule driven integration and fielding process. This will allow continued baseline improvements while rapidly integrating limited urgent needs fleet-wide.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force			Date: February 2020
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*	Project (Number/Name) 675249 / *MQ-9 Upgrade*	

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
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
MQ-9 Upgrade	SS/CPFF	GA-ASI : Poway, CA	0.000	67.382	Mar 2019	57.855	Mar 2020	42.220	Jan 2021	-		42.220	58.461	225.918	-
Operator Simulator	TBD	TBD : TBD	0.000	2.680	Jun 2019	8.000	Mar 2020	9.497	Jan 2021	-		9.497	13.998	34.175	-
Reliability and Maintainability	SS/CPFF	GA-ASI : Poway, CA	0.000	-		-		1.636	Apr 2021	-		1.636	1.348	2.984	-
Communications	SS/CPFF	GA-ASI : Poway, CA	0.000	-		0.168	Oct 2019	0.468	Oct 2020	-		0.468	0.362	0.998	-
		Subtotal	0.000	70.062		66.023		53.821		-		53.821	74.169	264.075	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
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Test Support	Various	Various : Various	0.000	0.638	Nov 2018	0.620	Nov 2019	0.527		-		0.527	0.298	2.083	-
		Subtotal	0.000	0.638		0.620		0.527		-		0.527	0.298	2.083	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
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	0.000	0.392	May 2019	3.432	May 2020	3.596	May 2021	-		3.596	2.819	10.239	-
		Subtotal	0.000	0.392		3.432		3.596		-		3.596	2.819	10.239	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	0.000	71.092		70.075		57.944		-		57.944	77.286	276.397	N/A

Remarks

PMA costs are included in Other Government Costs.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675249 / *MQ-9 Upgrade*

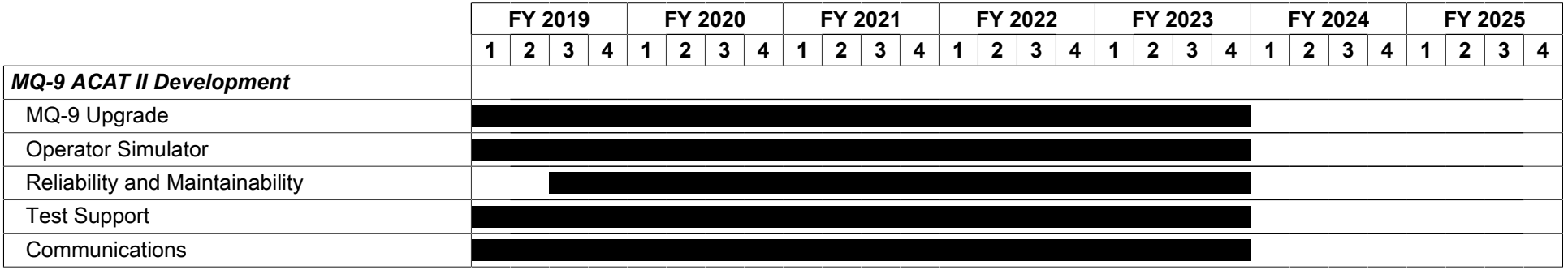

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675249 / *MQ-9 Upgrade*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MQ-9 ACAT II Development				
MQ-9 Upgrade	1	2019	4	2023
Operator Simulator	1	2019	4	2023
Reliability and Maintainability	3	2019	4	2023
Test Support	1	2019	4	2023
Communications	1	2019	4	2023