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 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205219F / *MQ-9 UAV*							
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	48.864	184.353	108.845	154.996	0.000	154.996	236.000	168.416	172.000	43.000	1,116.995	2,233.469
675212: *MQ-9 SLAM*	0.000	0.000	0.000	6.290	0.000	6.290	92.940	76.830	119.680	8.788	194.031	498.559
675246: *MQ-9 Development and Fielding*	0.000	115.618	28.244	50.931	0.000	50.931	61.003	33.006	33.607	34.212	0.000	356.621
675247: *Squadron Operations Centers (SOC)*	0.000	7.011	5.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.763
675249: *MQ-9 Upgrade*	48.864	61.724	74.849	97.775	0.000	97.775	82.057	58.580	18.713	0.000	922.964	1,365.526
Program MDAP/MAIS Code: 424												

Note

This program, BA 7, PE 0205219F, project 675212, MQ-9 SLAM, is a new start.
This program, BA 7, PE 0205219F, project 675212, Reliability and Maintainability, is a new start.
This program, BA 7, PE 0205219F, project 675212, Test Support, is a new start.
This program, BA 7, PE 0205219F, project 675212, Communications, is a new start.

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 on specific aircraft and control station configurations to be tailored to fit mission needs.

The MQ-9 Reaper system has four separate development programs. This PE includes:

1. 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 and support equipment as well as resolving Diminishing Manufacturing Sources (DMS) issues.
2. Squadron Operations Centers (SOC). This effort is for development and fielding of standardized operations centers containing the equipment necessary for remote split operation, to provide mission data and tasking information to the aircrew and disseminate and/or exchange mission data with decision-makers and the intelligence community.
3. 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.
4. 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.

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 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*

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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 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.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	201.394	119.845	225.619	0.000	225.619
Current President's Budget	184.353	108.845	154.996	0.000	154.996
Total Adjustments	-17.041	-11.000	-70.623	0.000	-70.623
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	-10.400	-11.000			
• 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	-6.641	0.000			
• Other Adjustments	0.000	0.000	-70.623	0.000	-70.623

Change Summary Explanation

FY18 Base
The total distributed to AFLCMC/WII was $178.840M. PRPC has a total of $184.353 which does not match. The delta is $5.513. This is documented in the Thrust labeled Other Rescissions in the R-2A for BPAC 675249. The remaining deltas are explained below.
- $10.4M Reduction in FY18 Spending bill - "Release 3 excess to need"
- $6.641M Small Business Innovation Rescission

FY19 Base
- $11M reduction in FY19 Spending Bill - "Program excess"

FY20 Base
- $10M reversal of Dismount Radar Integration (BMC2)

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 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*

- $15.614M reduced to fund Air Force priorities
- $45.009M reduced to account for the availability of prior year execution balances

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force			Date: February 2019
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 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
675212: *MQ-9 SLAM*	0.000	0.000	0.000	6.290	0.000	6.290	92.940	76.830	119.680	8.788	194.031	498.559
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 7, PE 0205219F, project 675212, MQ-9 SLAM, is a new start.
This program, BA 7, PE 0205219F, project 675212, Reliability and Maintainability, is a new start.
This program, BA 7, PE 0205219F, project 675212, Test Support, is a new start.
This program, BA 7, PE 0205219F, project 675212, Communications, is a new start.

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.

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 prototyping.

Activities also include, but are not limited to, 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 Det 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: MQ-9 SLAM	0.000	0.000	5.963

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
Description: Develop and integrate upgrade capabilities to support of the MQ-9 modernization strategy. Development will combine 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 will include, but will not be limited to, upgrades of existing aircraft, Ground Control Station (GSC), communication, payload systems, and software updates needed to support new configurations and development, the addition of new capabilities and subsystems, as well as addressing and resolving Diminishing Manufacturing Sources (DMS) issues. 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. 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 2019 Plans:*** N/A ***FY 2020 Plans:*** Begin TME developing upgrade capabilities in conjunction with the CCL to include, but are not limited to: • Weapons usability improvements • Unified Tactical Situational Awareness • Design, development, integration, and testing of Moving Target Indicator (MTI) capability on medium altitude air vehicles for improved dismount and moving target detection, identification, tracking, and classification • Anti-ice/De-ice, Mode 5, Automated Dependent Surveillance - Broadcast (ADS-B) • Ku or Global Positioning System (GPS) jamming; data encryption, Identification Friend or Foe (IFF), electronic warfare, signature reduction • Link-16 (Airborne Mission Networking) capability, effort includes, but is not limited to, developmental testing, software updates, documentation and training ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 due to MQ-9 SLAM in first year execution in FY20.			
Title: Reliability and Maintainability	-	0.000	0.199

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
Description: Develop MQ-9 Reliability and Maintainability (R&M) improvements for aircraft and ground base infrastructure. Includes engineering change orders and associated studies, and general research. Address and resolve DMS issues. ***FY 2019 Plans:*** N/A ***FY 2020 Plans:*** Begin 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 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 due to Reliability and Maintainability in first year execution in FY20.			
Title: Test Support ***Description:*** MQ-9 SLAM testing will provide support for, but will not be limited to, activities for MQ-9 testing of weapon system hardware and software in accordance with (IAW) contract standards, developmental testing of new capabilities, and R&M upgrades. ***FY 2019 Plans:*** N/A ***FY 2020 Plans:*** Provide 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 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 due to Test Support in first year execution in FY20.	-	0.000	0.117
Title: Communications ***Description:*** Develop MQ-9 communications capabilities such as, 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., Bandwidth Efficient Common Data Link(BE-CDL) Secure Voice Multi Level Security (MLS), ARC-210 Guard Squelch and Secure Communications). ***FY 2019 Plans:*** N/A ***FY 2020 Plans:***	-	0.000	0.011

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
Develop communications capabilities to enable improved encrypted data links, terminal, command and control, ISR transmission, GCS communications, SATCOM usage, integrate IP-based network interfaces, improve primary data links, network system managers, operational durability, enhance remote split operations, supporting communications equipment and associated technical orders and flight manuals. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 due to Communications in first year execution in FY20.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	6.290

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• APAF 06 PRDTB1: *MQ-9*	-	-	-	-	-	-	-	-	-	138.700	138.700
• APAF 05 PRDTB2: *MQ-9 Mods*	-	-	0.100	-	0.100	0.100	0.100	26.793	0.000	144.888	171.981

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, the prime contractors. 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.

E. 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 / 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 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
MQ-9 SLAM	SS/CPAF	GA-ASI : Poway, CA	0.000	-		-		2.311	Jul 2020	0.000		2.311	403.049	405.360	-
Operator Simulator	SS/CPAF	L3 : Salt Lake City, UT	0.000	-		-		-		-		-	16.469	16.469	-
Reliability and Maintainability	SS/CPAF	GA-ASI : Poway, CA	0.000	-		-		0.199	Jul 2020	-		0.199	16.737	16.936	-
Communications	SS/CPAF	GA-ASI : Poway, CA	0.000	-		-		0.011	Jul 2020	-		0.011	4.646	4.657	-
		Subtotal	0.000	-		-		2.521		0.000		2.521	440.901	443.422	N/A

Test and Evaluation ($ 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
Test Support	Various	Various : Various	0.000	-		-		0.117	Jul 2020	-		0.117	11.035	11.152	-
		Subtotal	0.000	-		-		0.117		-		0.117	11.035	11.152	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
Other Government Costs	Various	Various : Various	0.000	-		-		3.652		-		3.652	40.333	43.985	-
		Subtotal	0.000	-		-		3.652		-		3.652	40.333	43.985	N/A

	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
Project Cost Totals	0.000	-		0.000		6.290		0.000		6.290	492.269	498.559	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675212 / *MQ-9 SLAM*

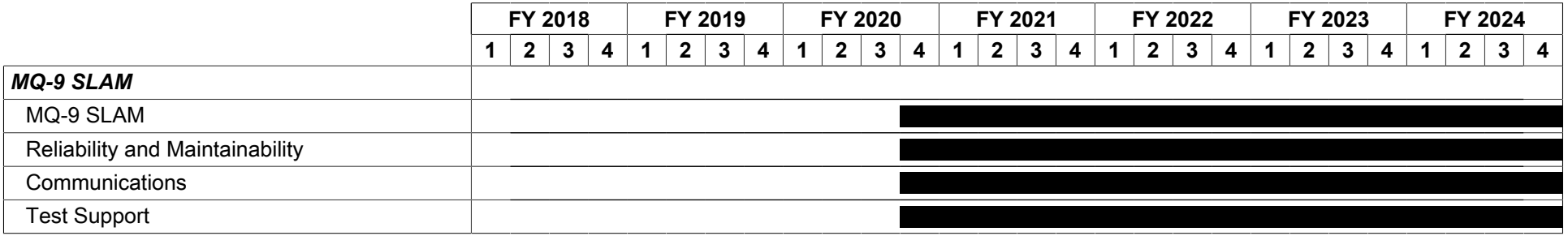

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675212 / *MQ-9 SLAM*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MQ-9 SLAM				
MQ-9 SLAM	4	2020	4	2024
Reliability and Maintainability	4	2020	4	2024
Communications	4	2020	4	2024
Test Support	4	2020	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force			Date: February 2019
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 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
675246: *MQ-9 Development and Fielding*	0.000	115.618	28.244	50.931	0.000	50.931	61.003	33.006	33.607	34.212	0.000	356.621
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 on 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 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 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 2018	FY 2019	FY 2020
Title: Ground Control Station (GCS) Development	53.255	18.878	28.130
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 2019 Plans:*** Will continue GCS design/development, manufacturing and testing to include, but not limited to: • Hardware/Software Development • Integration and test • Procure additional Block 50 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			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
• Block 30 Articulating Arm • Block 30 Monitor • Processor(s) ***FY 2020 Plans:*** Will continue GCS design/development, manufacturing and testing to include, but not limited to: • Hardware/Software Development • Integration and test • Procure additional Block 50 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 2019 to FY 2020 Increase/Decrease Statement:*** Funding increased due to support the Block 30 monitor, articulating arm, and Linux processor hardware, Block 50 development effort, Block 50 DMS, and Block 50 software update ramps up.			
Title: MQ-9 MTS-B Electro-Optic/Infrared (EO/IR) Sensor ***Description:*** Develop improved Multi-Spectral Targeting System (MTS-B) modes of operation and upgrade full motion video capability to include, but not limited to, an all digital architecture employing High-Definition (HD) camera formats, imagery improvements across all multi-spectral bands (color and infrared) and Target Location Accuracy (TLA) enhancements to support use of coordinate seeking weapons, and integration of High Definition Electro-optical Infra-red sensor upgrades, and software updates. ***FY 2019 Plans:*** Develop improved MTS-B modes of operation and upgrade full motion video capability to include, but not limited to, an all digital architecture employing HD camera formats, imagery improvements across all multi-spectral bands (color and infrared) and TLA enhancements to support use of coordinate seeking weapons, and integrated of HD EO/IR sensor upgrades and software updates. Effort will continue under the MQ-9 ACATII programs. ***FY 2019 to FY 2020 Increase/Decrease Statement:***	7.840	0.005	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
Funding decreased as the MTS-B development efforts continue under the MQ-9 ACATII programs.			
Title: Operator Simulator	4.690	3.769	1.925
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 2019 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 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 2019 to FY 2020 Increase/Decrease Statement:*** Funding decreased as the Operator Simulator development efforts continue under the MQ-9 ACATII programs.			
Title: Release 1 and Release 2	37.783	1.574	4.122
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: Take Off and Landing Data (TOLD), MTS-B Integration, GCS Block 50, Internet Protocol (IP) Migration, Synthetic Aperture Radar (SAR) Development, GCS Block 30, 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			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
AFSOC will cost share during development, where appropriate, on joint efforts that are required by both programs to support the new capabilities. ***FY 2019 Plans:*** Continue developing and integrating the software and data to update the MQ-9 Block 5 capabilities that includes, but is not limited to: • Resolution of DMS issues ***FY 2020 Plans:*** Continue developing and integrating the software and data to update the MQ-9 Block 5 capabilities that includes, but is not limited to: • Resolution of DMS issues • Verified maintenance technical orders • Flight manuals • Training • System supportability analysis • Design code software evaluation. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding increased to support test assets verified maintenance technical orders, flight manuals, training, system supportability analysis, logistic analysis, and design code software evaluation.			
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 2019 Plans:*** Will continue test support ***FY 2020 Plans:*** Will continue test support ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding increased as the Test Support development efforts continue to support GCS, Hybrid Release 2 software test support.	2.120	0.262	0.397
Title: Communications	-	0.010	6.389

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
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 2019 Plans:*** Begin to develop and enhance MQ-9 communications capabilities, to include but not limited to reduction of legacy signal blockages, control module, and secure triple link modem and solutions of various DMS issues. ***FY 2020 Plans:*** Continue to develop and enhance MQ-9 communications capabilities, to include but not limited to, solutions of various DMS issues. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding increased due to the communications development effort contract award of the reduction of legacy C-band signal blockages effort.			
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 2019 Plans:*** Develop program protection Technology Insertion capabilities, functionality for the MQ-9 Weapon System and control module. 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 and will continue under the MQ-9 ACATII programs. ***FY 2020 Plans:*** MQ-9 Technology Insertion efforts will continue during FY20 ***FY 2019 to FY 2020 Increase/Decrease Statement:***	9.930	3.746	9.968

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Funding increased in order to support the communications security control module contract award.			
Accomplishments/Planned Programs Subtotals	115.618	28.244	50.931

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• APAF 04 Line Item PRDTB1: *MQ-9*	228.253	135.903	189.205	-	189.205	90.047	284.887	167.759	0.000	0.000	1,096.054
• APAF 06 Line Item PRDTB1: *MQ-9 Spares*	30.093	103.890	72.852	-	72.852	44.041	81.412	38.268	0.000	0.000	370.556
• APAF 05 Line Item PRDTB2: *MQ-9 Mods*	121.945	153.387	100.296	-	100.296	84.076	36.913	22.110	0.000	0.000	518.727
• APAF 07 Line Item PRDTB1: *MQ-9*	36.368	25.671	26.607	-	26.607	26.622	27.154	27.648	-	0.000	170.070

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.

E. 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
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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
Ground Control Station (GCS) Development	SS/CPFF	GA-ASI : Poway, CA	0.000	48.452	Oct 2017	15.636	Oct 2018	24.371	Oct 2019	-		24.371	102.951	191.410	349.818
Multi-Spectral Targeting System (MTS)-B EO/IR Sensor	SS/CPFF	Raytheon : McKinney, TX	0.000	7.107	Mar 2018	-		-		-		-	0.000	7.107	112.944
Operator Simulator	SS/CPIF	L3 Comm : Salt Lake City, UT	0.000	4.690	Mar 2018	3.769	Mar 2019	1.925	Mar 2020	-		1.925	31.391	41.775	56.512
Release1 and Release 2	SS/CPFF	GA-ASI : Poway, CA	0.000	34.247	Feb 2018	1.195	Feb 2019	3.571	Feb 2020	-		3.571	0.000	39.013	161.096
Communication	SS/CPFF	GA-ASI : Poway, CA	0.000	-		0.010	Sep 2019	6.389	Nov 2019	-		6.389	0.727	7.126	17.336
MQ-9 Program Protection Technology Insertion	SS/CPFF	GA-ASI : Poway, CA	0.000	9.000	Apr 2018	2.845	Apr 2019	8.637	Apr 2020	-		8.637	19.105	39.587	58.239
Completed Efforts	SS/ Various	Various : Various	0.000	-		-		-		-		-	0.000	0.000	77.805
		Subtotal	0.000	103.496		23.455		44.893		-		44.893	154.174	326.018	N/A

Test and Evaluation ($ 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
Test Support	Various	Various : Various, CA	0.000	2.120	May 2018	0.262	May 2019	0.397	May 2020	-		0.397	0.759	3.538	22.665
		Subtotal	0.000	2.120		0.262		0.397		-		0.397	0.759	3.538	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
Other Government Costs	Various	Various : Various	0.000	10.002	May 2018	4.527	May 2019	5.641	May 2020	-		5.641	6.895	27.065	119.924
		Subtotal	0.000	10.002		4.527		5.641		-		5.641	6.895	27.065	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force			Date: February 2019
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	115.618		28.244		50.931		-		50.931	161.828	356.621	N/A

Remarks

PMA costs are included in Other Government Costs.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force		Date: February 2019
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*

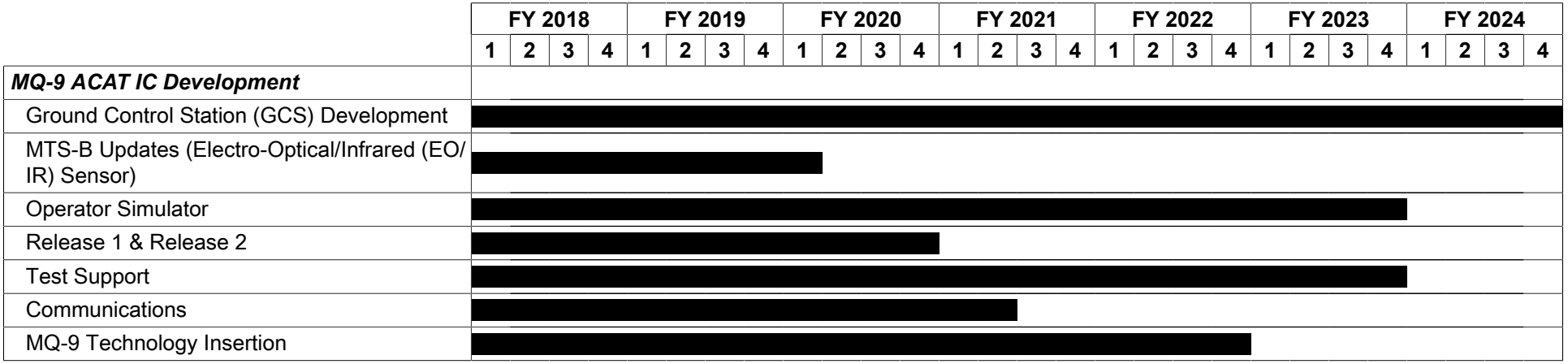

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675246 / *MQ-9 Development and Fielding*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MQ-9 ACAT IC Development				
Ground Control Station (GCS) Development	1	2018	4	2024
MTS-B Updates (Electro-Optical/Infrared (EO/IR) Sensor)	1	2018	1	2020
Operator Simulator	1	2018	4	2023
Release 1 & Release 2	1	2018	4	2020
Test Support	1	2018	4	2023
Communications	1	2018	2	2021
MQ-9 Technology Insertion	1	2018	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force			Date: February 2019
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 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
675247: *Squadron Operations Centers (SOC)*	0.000	7.011	5.752	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.763
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 integrate 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Squadron Operations Center	7.011	5.752	-
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 2019 Plans:*** -Complete design review, development, and delivery of Developmental Test (DT) SOC to integrate capabilities into Remotely Piloted Aircraft (RPA) SOC. -Integration of emerging technologies into the SOC baseline. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** RDT&E efforts for MQ-9 DT SOC completed in FY19; RDT&E for further RPA SOC development not funded in FY20.			
Accomplishments/Planned Programs Subtotals	7.011	5.752	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 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
• OPAF 03 Line Item 837300: *Base Communications Infrastructure*	7.529	87.378	7.898	-	7.898	82.282	83.292	53.818	0.000	0.000	322.197

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.

E. 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 / 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 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
RPA SOC Development	Various	402nd SMXG : Robins AFB, GA	0.000	7.011	Sep 2019	5.752	Sep 2019	-		-		-	0.000	12.763	-
		Subtotal	0.000	7.011		5.752		-		-		-	0.000	12.763	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	0.000	7.011		5.752		-		-		-	0.000	12.763	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675247 / *Squadron Operations Centers (SOC)*

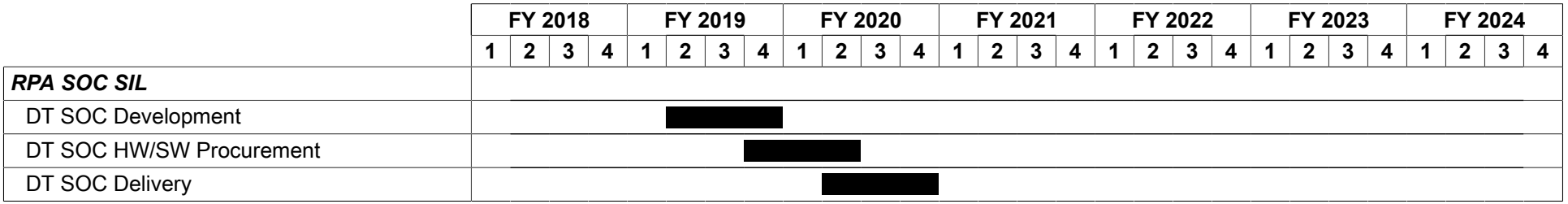

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675247 / *Squadron Operations Centers (SOC)*

Schedule Details

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

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force			Date: February 2019
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 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
675249: *MQ-9 Upgrade*	48.864	61.724	74.849	97.775	0.000	97.775	82.057	58.580	18.713	0.000	922.964	1,365.526
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 19 July 2018, 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 elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

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 2018	FY 2019	FY 2020
Title: MQ-9 Upgrade	56.919	69.535	87.217
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 (GSC), 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 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
Candidate capabilities are determined by Major Command (Air Combat Command (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 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 2019 Plans:*** Continue TME development of upgrade capabilities in conjunction with the CCL to include, but not limited to: • Auto Take-off and Landing Capability (ATLC), Take off & Landing Data (TOLD) • Weapons usability improvements (i.e. auto-lockout, Joint Air to Ground Missile (JAGM)) • Reconnaissance, targeting and technology improvements in MTS-B, Synthetic Aperture Radar, sensors, and Global Positioning System (GPS) • System corrections, technology upgrades within the GCS, Unmanned Aerial Vehicle communications and ground support (i.e. batteries, engine, Bandwidth Efficient (BE) Common Data Link (CDL) and Beyond Line of Sight) • Expand theater capabilities with Anti-ice/De-ice, Mode 5, Automated Dependent Surveillance - Broadcast (ADS-B) • Improve system security and the ability to self-protect through Ku or GPS jamming; data encryption, Identification Friend or Foe(IFF), electronic warfare, signature reduction • High Definition Electro-optical Infra-red sensor upgrades • Link-16 (Airborne Mission Networking) capability ***FY 2020 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 • 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			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
• 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 • Audio-Multi Level Security (MLS) system • 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 ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding increased due to MQ-9 Upgrade continuing at an increased level as efforts under MQ-9 Development program (BPAC:675246) decelerate.			
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 2019 Plans:*** Continue implementing updates to keep the operator simulator current with the aircraft and GCS, including but not limited to: • Sensors • Databases • Weapons usability improvements (i.e. auto-lockout, JAGM) • Software ***FY 2020 Plans:*** Continue implementing updates to keep the operator simulator current with the aircraft and GCS. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding increased due to MQ-9 Upgrade operator simulators continue to update in order to keep concurrent with aircraft and GCS configurations.	2.500	2.309	8.000
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.	-	0.839	0.561

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
FY 2019 Plans: Begin 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 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 2019 to FY 2020 Increase/Decrease Statement:*** Funding decreased as reliability and maintainability improvements will continue at a decreased level as efforts under MQ-9 SLAM program (BPAC: 675212) ramps up.			
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 2019 Plans:*** Continue testing support including, but not limited to, activities for MQ-9 testing of weapon system hardware and software (i.e., platform, weapon usability, SAR, MTS-B, CGS) support IAW contract standards. ***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 2019 to FY 2020 Increase/Decrease Statement:*** Funding increased due to MQ-9 Upgrade continuing to ramp up testing of weapon system hardware and software.	0.020	0.934	1.829
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 2019 Plans:*** Continue developing communications capabilities to enable improved encrypted data links, terminal, command and control, ISR transmission, GCS communications, SATCOM usage, integrate IP-based network interfaces, improve primary data links,	2.285	1.232	0.168

Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
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 2018	FY 2019	FY 2020
network system managers, operational durability, enhance Remote Split Operations, supporting communications equipment and associated technical orders and flight manuals. ***FY 2020 Plans:*** MQ-9 Upgrade communications capabilities development will continue ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Funding decreased due to MQ-9 Upgrade Communications continuing at a decreased level as efforts under MQ-9 SLAM program (BPAC: 675212) ramps up.			
Accomplishments/Planned Programs Subtotals	61.724	74.849	97.775

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• APAF 06 PRDTB1: *MQ-9 UAV*	0.000	1.730	78.070	-	78.070	42.290	38.080	50.340	14.358	98.505	323.373
• APAF 05 PRDTB2: *MQ-9 Mods*	112.848	15.821	280.848	-	280.848	104.262	122.186	103.968	11.897	357.100	1,108.930

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, the prime contractors. 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.

E. 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 / 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 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
MQ-9 Upgrade	SS/CPFF	GA-ASI : Poway, CA	45.990	53.242	Apr 2018	63.262	Mar 2019	83.565	Jan 2020	-		83.565	123.728	369.787	-
Operator Simulator	SS/CPIF	L3 Comm : Salt Lake City, UT	0.000	2.500	Feb 2018	2.309	Jun 2019	8.000	Jan 2020	-		8.000	23.500	36.309	-
Reliability and Maintainability	SS/CPFF	GA-ASI : Poway, CA	0.000	-		0.839	Jun 2019	0.561	Apr 2020	-		0.561	2.967	4.367	-
Communications	SS/CPFF	GA-ASI : Poway, CA	0.000	2.285	Aug 2018	1.232	May 2019	0.168	Oct 2019	-		0.168	0.849	4.534	-
		Subtotal	45.990	58.027		67.642		92.294		-		92.294	151.044	414.997	N/A

Test and Evaluation ($ 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
Test Support	Various	Various : Various	0.031	0.020	Apr 2018	0.934	Nov 2018	1.829	Nov 2019	-		1.829	1.892	4.706	-
		Subtotal	0.031	0.020		0.934		1.829		-		1.829	1.892	4.706	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
Other Government Costs	Various	Various : Various	2.843	3.677	May 2018	6.273	May 2019	3.652	May 2020	-		3.652	6.415	22.860	-
		Subtotal	2.843	3.677		6.273		3.652		-		3.652	6.415	22.860	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	48.864	61.724		74.849		97.775		-		97.775	159.351	442.563	N/A

Remarks

PMA costs are included in Other Government Costs.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675249 / *MQ-9 Upgrade*

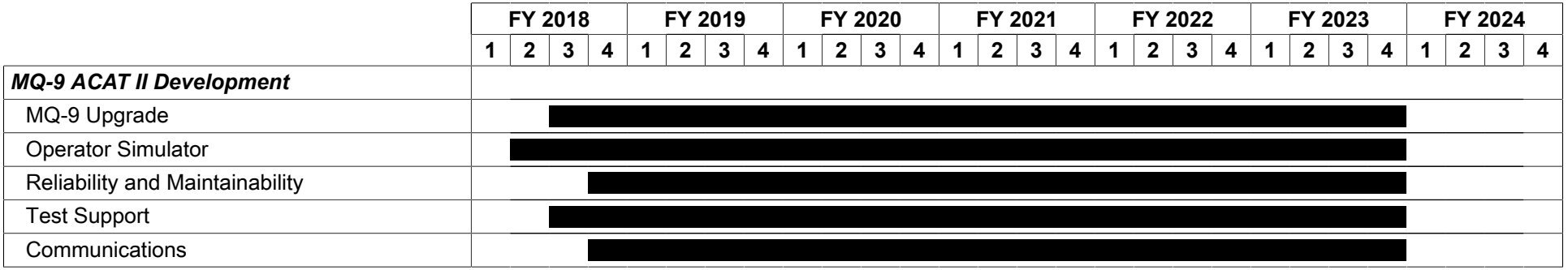

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0205219F / *MQ-9 UAV*	**Project (Number/Name)** 675249 / *MQ-9 Upgrade*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MQ-9 ACAT II Development				
MQ-9 Upgrade	3	2018	4	2023
Operator Simulator	2	2018	4	2023
Reliability and Maintainability	4	2018	4	2023
Test Support	3	2018	4	2023
Communications	4	2018	4	2023