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 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*							
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	-	12.873	8.651	6.553	0.000	6.553	6.691	6.810	6.931	7.072	0.000	55.581
673587: *Air Traffic Control Systems*	-	12.873	8.651	6.553	0.000	6.553	6.691	6.810	6.931	7.072	0.000	55.581
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

To support the Air Force worldwide flying mission, this program element funds research, development, and management of new air traffic control communications, surveillance, automation, positioning, and precision approach and landing systems. When applicable, this includes joint efforts with the Federal Aviation Administration (FAA) and coordination with the International Civil Aviation Organization and the North Atlantic Treaty Organization. ATCALS development funding currently focuses on Air Traffic Control (ATC) Future Technology (formerly referred to as the Federal Aviation Administration (FAA) Next Generation Air Transportation System {NextGen ATS}). The program name was changed to more accurately reflect the scope of the effort which includes military and civil capabilities/requirements. In order to enable safe and efficient military flight operations in a changing global airspace, the ATC Future technology effort is designed to identify the warfighter's emerging airspace needs, analyze technologies, formulate requirements and positions, and advise DoD aviation and air traffic communities.

ATCALS ATC Future Technology supports the 2018 National Defense strategic approach to "generate decisive and sustained U.S. military advantages" by enabling "forward force maneuver and posture resilience" through the research and development of technology and strategies that support adaptive, agile basing concepts of operations while providing ATCALS capabilities necessary to ensure enduring, resilient, efficient and safe air operations. ATC Future Technology will "evolve innovative operational concepts" by modernizing airfield operations and providing adaptive ATC services and systems appropriate for the current environment, which will bolster "Dynamic Force Employment" through scalable employment operations and globally deployable forces for the four layers of the "Global Operating Model: "contact, blunt, surge, and homeland".

FY21 efforts will continue to research and develop new technologies in the areas of aircraft launch and recovery for both fixed and expeditionary operations; military and civil airspace interoperability; optimization of flight operations; Unmanned Aircraft System (UAS) access to civil airspace; ATC training study; DoD/AF or civil US and international mandates (e.g., Mode-5); improved Notice to Airmen (NOTAMs) software capabilities; conduct of service operational test and evaluations as required; mitigation of windfarm interference (e.g., with Infill Radars); technology and evaluation of new civil air traffic control and landing system technologies that may have military utility to include an Early Operational Assessment (EOA) of Remote Virtual ATC Tower System technology, mobile TACAN antenna technology, and expeditionary technology development and prototyping. As these technologies and architectures mature, fixed base and deployable ground system upgrades will be coordinated and fielded concurrently with related aircraft avionics capabilities that may be required (manned and unmanned). ATC Future Technology analysis and recommendations will be captured in program charters and incorporated into the ATC Future Technology Strategic Roadmap. When implemented, these efforts will enable DoD aircraft to take advantage of new technologies and operational capabilities, to enhance safety, security, efficiency, affordability, and flight operations.

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 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the ATCALS 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 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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	13.271	5.651	6.565	0.000	6.565
Current President's Budget	12.873	8.651	6.553	0.000	6.553
Total Adjustments	-0.398	3.000	-0.012	0.000	-0.012
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	3.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.398	0.000			
• Other Adjustments	0.000	0.000	-0.012	0.000	-0.012

Change Summary Explanation

FY20 Congressional add for Infill Radars continues development of procedures to ensure unmanned systems and manned aircraft can operate within close proximity safely in the National Airspace System. Funding obligation is planned in Mar 20

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: ATC Future Technologies	12.873	8.651	6.553	0.000	6.553
Description: Includes efforts to implement ATC Future Technologies efficiencies and capabilities. Focus is on aircraft launch and recovery, airspace interoperability, expeditionary technology development and prototyping, optimization of flight capability, adherence to mandates, technology research and analysis, Notice to Airmen software upgrades, ATC training and technology study, Early Operational Assessment of Remote Virtual Air Traffic Control Tower technology, development of standards for certification of Infill radars for civil implementation, and development of procedures and tools to support ATC Management of Unmanned Aircraft Systems (UASs) in close proximity with manned aircraft.					
FY 2020 Plans:					

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 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Continue ATC Future Technology analysis and research which will include the following tasks: -- Continue development and maturation of technology to support Aircraft Launch and Recovery for both expeditionary and fixed operations. -- Continue supporting advancement in airspace interoperability between civilian and military fleets in both national and international airspace. -- Continue analyzing current and emerging aviation technology to help optimize the efficiency, effectiveness, and safety of flight capabilities. -- Continue to monitor emerging DoD/USAF and civil US and International mandates to ensure compliance of USAF fleets. -- Continue development of Notice to Airmen (NOTAMs) software upgrades to enhance NOTAM creation and query applications. -- Begin Expeditionary Technology Development and Prototyping. -- Continue ATC Training and Technology Study. -- Continue Early Operational Assessment of a Remote Virtual Air Traffic Control Tower capability to assess ability to meet AF flying/ATC missions in lieu of brick and mortar control towers. -- Continue development of Infill radar requirements and threshold parameters to enable operational validation for use in the National Airspace System. -- Continue effort with FAA and Air Force Research Laboratory to develop air traffic control management technology and procedures/tools to ensure unmanned and manned aircraft can safely operate in civil airspace.					
FY 2021 Base Plans: - Will continue ATC Future Technology Analysis and Research which will include the following tasks: -- Will continue development and maturation of technology to support Aircraft Launch and Recovery for both expeditionary and fixed operations. -- Will continue supporting advancement in airspace interoperability between civilian and military fleets in both national and international airspace. -- Will continue to monitor emerging DoD/USAF and civil US and International mandates to ensure compliance of USAF fleets. -- Will continue development of NOTAMs software upgrades to enhance NOTAM creation and query applications. -- Will continue Expeditionary Technology Development and Prototyping. -- Will continue ATC Training and Technology Study.					

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 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*

C. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
-- Will continue Early Operational Assessment of a Remote Virtual Air Traffic Control Tower capability to assess ability to meet AF flying/ATC missions in lieu of brick and mortar control towers. -- Will continue development of Infill radar requirements and threshold parameters to enable operational validation for use in the National Airspace System. -- Will continue effort with FAA and Air Force Research Laboratory to develop air traffic control management technology and procedures/tools to ensure unmanned and manned aircraft can safely operate in civil airspace. ***FY 2021 OCO Plans:*** None ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY20 funds reduced due to prior year under execution of funds allocated to D-RAPCON Mode 5 integration studies.					
Accomplishments/Planned Programs Subtotals	12.873	8.651	6.553	0.000	6.553

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

ATCALS is a basket program element with multiple programs in various stages of acquisition which provide the air traffic control infrastructure to support peacetime and wartime missions. The overall strategy for ATC Future Technology is focused on developing a long-term strategy for and executing the development of lightweight, scalable, readily deployable ATC equipment in order to support the National Defense Strategy.

Current contracting efforts include Early Operational Assessment (EOA) of Remote Virtual ATC Control Tower technology, Expeditionary Technology Development and Prototyping and NOTAMs software upgrades. Multiple ATC Future Technology Enterprise Architecture Implementation Tasks, Infill radar certification, and ATC Management of UASs are being executed via Military Inter-Departmental Purchase Requests, and Project Orders with various organizations (FAA, MITRE, Army, Air Force Research Laboratory, and Air Force Flight Standards Agency). The Remote Virtual ATC Control Tower EOA contract award was a full and open competition using Other Transaction Authority (OTA) procedures. The Expeditionary Technology Development and Prototyping effort is planned to use full and open competition using Other Transaction Authority (OTA) procedures.

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 I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305114F *I Air Traffic Control, Approach, and Landing System (ATCALS)*

The Air Force Program Executive Officer (PEO) Digital is the PEO for ATCALS and is also the delegated milestone decision authority. Program management, contracts, logistics, and financial management support is provided by the Air Force Life Cycle Management Center Aerospace Management Systems Division (AFLCMC/HBA) which is aligned under PEO/Digital.

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 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*	**Project (Number/Name)** 673587 / *Air Traffic Control Systems*

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
Expeditionary Technology Development and Prototyping	C/FFP	AFLCMC/HBA : Hanscom AFB, MA	-	-		2.000	Jan 2020	2.811	Jul 2021	-		2.811	Continuing	Continuing	-
NOTAM Software	C/FFP	AFDW/PK : JB Andrews, MD	-	0.418	May 2020	0.421	May 2020	0.424	Jan 2021	-		0.424	Continuing	Continuing	-
		Subtotal	-	0.418		2.421		3.235		-		3.235	Continuing	Continuing	N/A

Support ($ 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
Research/Analysis	MIPR	FAA : Washington, DC	-	3.181	Oct 2018	1.615	Mar 2020	1.583	Oct 2020	-		1.583	Continuing	Continuing	-
Strategic Planning	WR	MITRE : Hanscom AFB, MA	-	0.471	Oct 2018	0.490	Mar 2020	0.510	Oct 2020	-		0.510	Continuing	Continuing	-
		Subtotal	-	3.652		2.105		2.093		-		2.093	Continuing	Continuing	N/A

Remarks

Various contract types, performing activity and city/states are result of the use of Military Interdepartmental Purchase Requests (MIPR), Work Request (WR), Purchase Requests (PR), Project Orders (PO), etc. that are sent to multiple agencies in support of some tasks.

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	-	-		-		-		-		-	Continuing	Continuing	-
Surveillance Radar/ Automation System Upgrades (Mode 5)	WR	Various : Various	-	1.441	Aug 2019	-		-		-		-	0.000	1.441	-
Remote Air Traffic Control Tower Capability EOA	WR	Various : Various	-	0.350	Feb 2019	0.900	Feb 2020	1.000	Feb 2021	-		1.000	0.000	2.250	-

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 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*	**Project (Number/Name)** 673587 / *Air Traffic Control Systems*

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
ATCALS Operational Test & Evaluation (OT&E)	WR	Various : Various	-	0.250	Jun 2019	0.225	Apr 2020	0.225	Nov 2020	-		0.225	Continuing	Continuing	-
Infill Radar Certification	MIPR	FAA/AFRL : Washington/Griffiss, DC	-	1.940	Sep 2019	3.000	May 2020	-		-		-	0.000	4.940	-
Air Traffic Control of UASs	MIPR	AFRL : Griffiss, NY	-	4.822	Jul 2019	-		-		-		-	0.000	4.822	-
		Subtotal	-	8.803		4.125		1.225		-		1.225	Continuing	Continuing	N/A

Remarks

Various contract types, performing activity and city/states are result of the use of Military Interdepartmental Purchase Requests (MIPR), Work Request (WR), Purchase Requests (PR), Project Orders (PO), etc. that are sent to multiple agencies in support of some tasks.

Operational FY22.

	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	-	12.873		8.651		6.553		-		6.553	Continuing	Continuing	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 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*	**Project (Number/Name)** 673587 / *Air Traffic Control Systems*

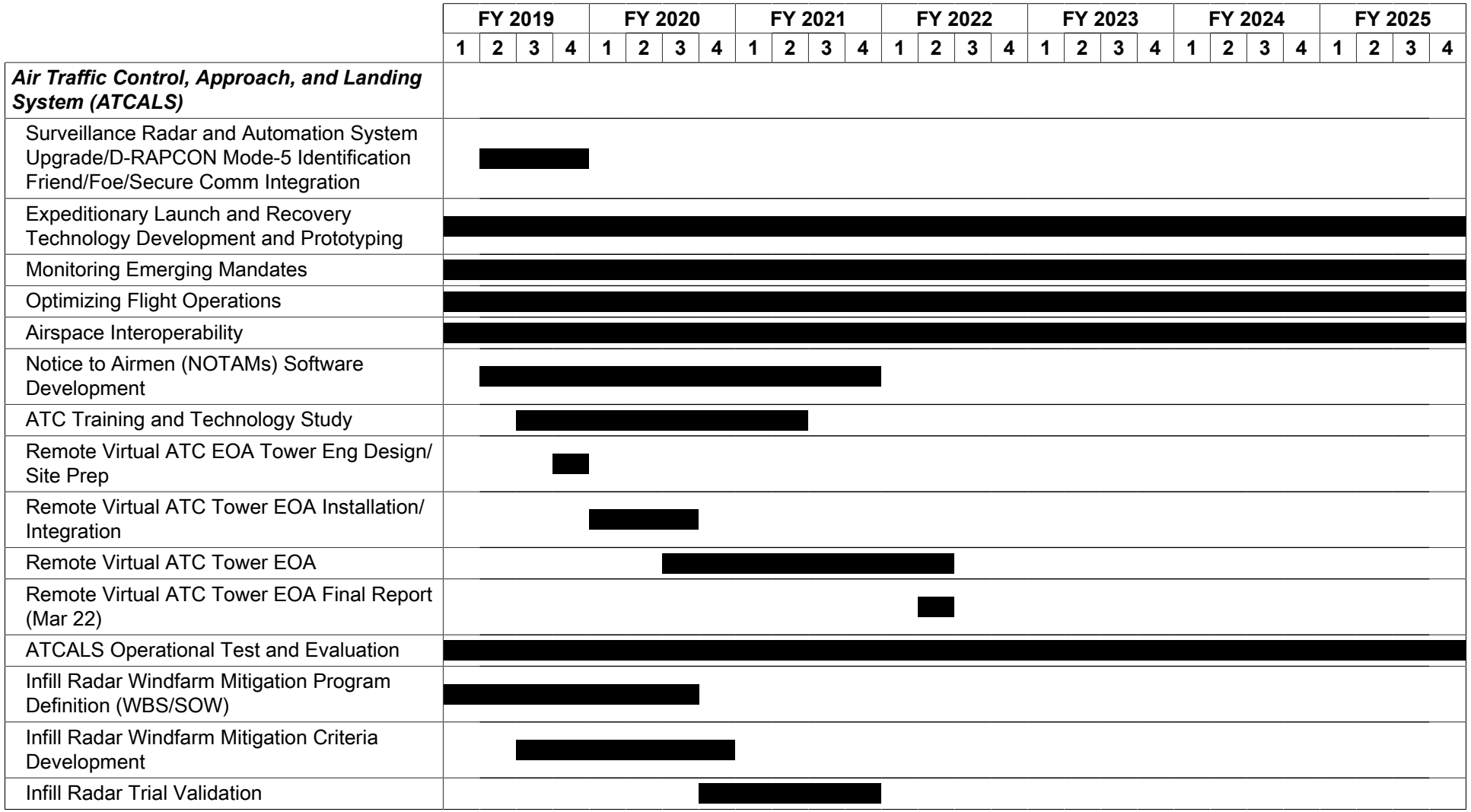

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*	**Project (Number/Name)** 673587 / *Air Traffic Control Systems*

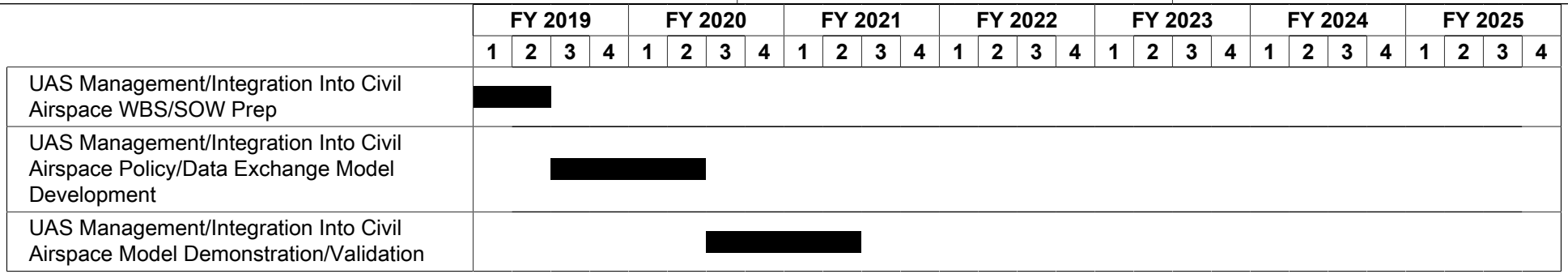

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0305114F / *Air Traffic Control, Approach, and Landing System (ATCALS)*	**Project (Number/Name)** 673587 / *Air Traffic Control Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Air Traffic Control, Approach, and Landing System (ATCALS)				
Surveillance Radar and Automation System Upgrade/D-RAPCON Mode-5 Identification Friend/Foe/Secure Comm Integration	2	2019	4	2019
Expeditionary Launch and Recovery Technology Development and Prototyping	1	2019	4	2025
Monitoring Emerging Mandates	1	2019	4	2025
Optimizing Flight Operations	1	2019	4	2025
Airspace Interoperability	1	2019	4	2025
Notice to Airmen (NOTAMs) Software Development	2	2019	4	2021
ATC Training and Technology Study	3	2019	2	2021
Remote Virtual ATC EOA Tower Eng Design/Site Prep	4	2019	4	2019
Remote Virtual ATC Tower EOA Installation/Integration	1	2020	3	2020
Remote Virtual ATC Tower EOA	3	2020	2	2022
Remote Virtual ATC Tower EOA Final Report (Mar 22)	2	2022	2	2022
ATCALS Operational Test and Evaluation	1	2019	4	2025
Infill Radar Windfarm Mitigation Program Definition (WBS/SOW)	1	2019	3	2020
Infill Radar Windfarm Mitigation Criteria Development	3	2019	4	2020
Infill Radar Trial Validation	4	2020	4	2021
UAS Management/Integration Into Civil Airspace WBS/SOW Prep	1	2019	2	2019
UAS Management/Integration Into Civil Airspace Policy/Data Exchange Model Development	3	2019	2	2020
UAS Management/Integration Into Civil Airspace Model Demonstration/Validation	3	2020	2	2021