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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>
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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	-	208.965	33.502	43.651	27.000	70.651	49.051	39.720	24.397	16.692	Continuing	Continuing
126: <i>PEO Electronic Protect</i>	-	0.000	14.715	15.619	-	15.619	3.650	0.000	0.000	0.000	0.000	33.984
146: <i>Air & Msl Defense Planning Control Sys</i>	-	23.405	12.656	8.392	-	8.392	2.912	1.227	3.402	3.197	Continuing	Continuing
149: <i>Counter-Rockets, Artillery & Mortar</i>	-	14.785	6.131	0.908	-	0.908	0.000	0.000	0.000	0.000	Continuing	Continuing
FG5: <i>Counter Unmanned Aerial Systems (UAS)</i>	-	170.775	0.000	18.732	27.000	45.732	42.489	38.493	20.995	13.495	0.000	331.979

Note

ALPS was previously funded under PE 0603327A.

A. Mission Description and Budget Item Justification

Army Long-Range Persistent Surveillance (ALPS) is a passive sensor that provides long range surveillance against Cruise Missile (CM), Fixed Wing (FW), Rotary Wing (RW), and Unmanned Aircraft System (UAS) threats. Prototype systems will be provided to meet EUCOM, INDOPACOM, and CENTCOM (JUON-CC-0576) identified operational needs and to conduct an assessment by the combatant commander(s). The objectives of this effort are to provide component and subsystem maturity in a system-of-systems environment and to reduce subsequent integration risk.

The Air Missile Defense Planning and Control System (AMDPCS) provides integration of air and missile defense operations at all echelons. Specifically, the Air and Missile Defense Work Station (AMDWS) provides a correlated air picture using local radars, allowing the Commander the visibility and situational understanding of the airspace; other automated defense design and staff planning tools in AMDWS affords soldiers horizontal and vertical collaborative planning with adjacent units. Air Defense System Integrator (ADSI) serves as a joint tactical data link gateway/air picture, and when correlated by Forward Area Air Defense Command and Control (FAAD C2) and displayed on AMDWS, provides a near real time, three dimensional air picture for the Commander. Joint Tactical Terminal (JTT) provides soldiers theater ballistic missile (TBM) early warning, allowing them to take appropriate actions. AMDPCS is fielded to Army air and missile defense commands (AAMDC), air defense artillery brigades (ADA BDE), air and missile defense battalions (AMD BN), and Terminal High Altitude Area Air Defense Batteries (THAAD BTRY). Air Defense Airspace Management (ADAM), a variant of AMDPCS with similar capabilities, is fielded to corps, divisions, brigade combat teams (BCTs), and multi-functional support brigades. As part of the capability and technology reuse, AMDWS and FAAD C2 are core components of the Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems currently deployed in multiple areas of operation.

The C-RAM system-of-systems is an evolutionary program that detects RAM launches, provides localized warning to the defended area, intercepts rounds in flight, and enhances response to and defeat of enemy forces. C-RAM combines multi-service fielded and non-developmental item sensors, command and control (C2) equipment, warning systems, and a modified U.S. Navy intercept system (Land-based Phalanx Weapon System [LPWS]), all connected via a wireless local area

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network. The FAAD C2 system has been enhanced to integrate the sensors, weapons, and warning systems to provide C2 for the C-RAM system-of-systems. FAAD C2 software correlates the RAM sensor data, evaluates the threat, provides early warning, directs engagements, and cues counterfire systems and reaction forces. FAAD C2 employs an agile software development, maintenance, and sustainment strategy, with Urgent Materiel Releases (UMR) every six (6) months and Full Materiel Releases (FMR) every 15-18 months to keep pace with rapidly fielding integrated systems to meet operational needs. C-RAM capability in theater is supported through the Overseas Contingency Operations (OCO) process. Base RDT&E supports FAAD C2 basic Air Defense functionality as well as directed enhancements to the C-RAM system-of-systems capability, such as development and integration of C-RAM network security enhancements and development of all-digital radar technology to address emerging threats.

The Counter-Unmanned Aircraft Systems (C-UAS) effort is in response to Joint Urgent Operational Need (JUON) CC-0558 to support identification, development, testing, evaluation, and integration of technologies to provide an overall evolutionary capability to defeat small UAS threats at 89 U.S. Central Command (USCENTCOM) sites. The C-UAS effort provides warfighters the ability to comprehensively detect, track, identify, and defeat enemy Groups 1 and 2 lightweight, low altitude, commercial off-the-shelf (COTS) UAS platforms with kinetic/non-kinetic means.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	212.373	43.502	24.944	-	24.944
Current President's Budget	208.965	33.502	43.651	27.000	70.651
Total Adjustments	-3.408	-10.000	18.707	27.000	45.707
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-15.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.408	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	18.707	27.000	45.707

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 149: *Counter-Rockets, Artillery & Mortar*

 Congressional Add: *All-Digital Radar Development*

 Congressional Add: *C-RAM Network Security Enhancements*

 Congressional Add: *Multi-Layered Tactical Protection System*

Congressional Add Subtotals for Project: 149

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	8.000	-
	5.000	-
	-	5.000
Congressional Add Subtotals for Project: 149	13.000	5.000
Congressional Add Totals for all Projects	13.000	5.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	
Change Summary Explanation FY 2021 Base funding of \$18.732 million supports Counter-Unmanned Aircraft System (C-UAS) detection capability enhancements using a common command and control. FY 2021 OCO funding increase of \$27.000 million supports technological development to keep pace with evolving threats.		

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) 126 / PEO Electronic Protect
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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
126: PEO Electronic Protect	-	0.000	14.715	15.619	-	15.619	3.650	0.000	0.000	0.000	0.000	33.984
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

ALPS was previously funded under PE 0603327A.

A. Mission Description and Budget Item Justification

Army Long-Range Persistent Surveillance (ALPS) is a passive sensor that provides long range surveillance against Cruise Missile (CM), Fixed Wing (FW), Rotary Wing(RW), and Unmanned Aircraft System (UAS) threats. Prototype systems will be provided to meet EUCOM, INDOPACOM, and CENTCOM (JUON-CC-0576) identified operational needs and to conduct an assessment by the combatant commander(s). The objectives of this effort are to provide component and subsystem maturity in a system-of-systems environment and to reduce subsequent integration risk.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: ALPS Development and Integration</p> <p>Description: Provide ALPS systems to meet multiple Combatant Command (COCOM) operational needs and integrate ALPS into the AIAMD architecture.</p> <p>Prototype systems are being provided to meet multiple Combatant Command operational needs and to conduct an assessment. The objectives of this effort are to prove component and subsystem maturity in a system-of-systems environment and to reduce subsequent integration risk. ALPS will also be integrated into the AIAMD architecture.</p> <p>FY 2020 Plans: Continue providing additional ALPS prototype systems to meet multiple Combatant Command identified operational needs and continue the assessment. Continue integration of ALPS to support the overall AIAMD architecture.</p> <p>FY 2021 Base Plans: Integrate, procure, deploy, and install ALPS Prototype systems to meet the urgent operational requirements of multiple combatant commands, specifically EUCOM, INDOPACOM, and CENTCOM. Site survey and Contractor Logistics Support (CLS) activities will be supporting efforts to ensure mission success. CLS will include deployment of field service representatives to support deployed prototype systems. Purchase,</p>	-	14.046	15.619	-	15.619

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) 126 / PEO Electronic Protect

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
assemble, deploy, install, support, and assess ALPS prototype systems in support of EUCOM, INDOPACOM, and CENTCOM (JUON-CC-0576) identified operational needs.					
FY 2020 to FY 2021 Increase/Decrease Statement: The quantity of assets assembled, deployed, and installed are different.					
Title: FY 2020 SBIR/STTR Transfer	-	0.669	-	-	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
Accomplishments/Planned Programs Subtotals	-	14.715	15.619	-	15.619

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
• EF9: System Integration and Test	74.295	97.746	0.166	-	0.166	0.169	-	-	-	0.000	172.376
• EX2: Lower Tier Air Missile Defense (LTAMD) Capability	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	0.000	1,590.085
• C50016: System Integration and Test Procurement	105.395	107.157	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• FM3: Future Interceptor	-	2.000	7.992	-	7.992	7.993	7.993	7.993	7.993	0.000	41.964
• C53101: MSE Missile	1,131.276	702.437	603.188	176.585	779.773	765.887	1,008.835	908.799	804.295	Continuing	Continuing
• 0604319A: Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	10.324	-	0.000	-	0.000	-	-	-	-	0.000	10.324
• C62001: IFPC Inc 2-I Block 1 Missile 1	166.536	-	0.000	-	0.000	-	-	-	-	0.000	166.536
• C62002: IFPC INC 2-I BLOCK 1 SYSTEM	31.286	9.337	106.261	-	106.261	237.803	392.134	368.447	274.566	0.000	1,419.834

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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• 0604117A: Maneuver - Short Range Air Defense (M-SHORAD)	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	0.000	1,189.856
• C14300: M-SHORAD - Procurement	-	233.300	378.654	158.300	536.954	330.738	80.412	436.129	728.215	Continuing	Continuing
• 0604820A: Radar Development	37.847	95.720	109.259	-	109.259	116.381	65.512	69.343	30.849	0.000	524.911
• S40: Army Integrated Air and Missile Defense	318.850	208.638	193.929	-	193.929	63.678	33.162	94.758	74.936	0.000	987.951
• BZ5075: IAMD Battle Command System	-	29.629	201.587	-	201.587	353.561	416.995	413.356	417.415	Continuing	Continuing
• 0604741A: Air Defense Command, Control and Intelligence - Eng Dev	208.965	33.502	43.651	27.000	70.651	49.051	39.720	24.397	16.692	0.000	442.978
• AD5070: AIR & MSL Defense Planning & Control Sys	29.913	39.061	47.374	15.143	62.517	68.778	102.399	-	-	0.000	302.668
• 0605052A: Indirect Fire Protection Capability Inc 2 - Block 1	92.674	194.366	235.770	-	235.770	341.077	181.830	98.210	13.639	0.000	1,157.566
• 149: Counter-Rockets, Artillery & Mortar	14.785	6.131	0.908	-	0.908	-	-	-	-	0.000	21.824
• 146: Air & Msl Defense Planning Control Sys	23.405	12.656	8.392	-	8.392	2.912	1.227	3.402	3.197	0.000	55.191

Remarks

ALPS was previously funded under PE 0603327A.

D. Acquisition Strategy

ALPS utilizes an existing Defense Ordnance Technology Consortium (DOTC) Other Transaction Authority (OTA) to develop and integrate prototype systems to meet multiple Combatant Command operational needs. An assessment of the prototype systems, provided in response to Combatant Command operational needs, will be used to refine requirements and assess the Army's longer-term strategy.

ALPS is executing an acquisition strategy to rapidly deliver COTS-based prototypes to COCOMs based on urgent, operational requirements. ASA(ALT) designated PEO MS as the OPR for ALPS (19 Jan 2018 memo).

The ALPS Acquisition Strategy consists of rapid integration and deployment activities. Site survey, procurement of prototype systems, deployment of those systems, and contractor logistics support are the primary subordinate tasks within the ALPS efforts to rapidly integrate and deploy systems. These tasks will end by 4QFY22 due

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Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
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to the conclusion of Urgent Need. ALPS will seek OMA OCO for contractor logistics support of the systems after the end of funding, assuming COCOMs continued need for ALPS capability. ALPS will participate yearly in an integration event at the PEO MS level to integrate with current C2 and Air and Missile Defense (AMD) systems.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020				
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev				Project (Number/Name) 126 / PEO Electronic Protect								
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Other Government Agencies & Government Program Management	Various	Various : Various	-	-		1.097		1.461		-		1.461	Continuing	Continuing	Continuing	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.669		-		-		-	0.000	0.669	-	
Subtotal			-	-		1.766		1.461		-		1.461	Continuing	Continuing	N/A	
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
ALPS Development and Integration	Various	Various : Various	-	-		12.949	May 2020	14.158	May 2021	-		14.158	Continuing	Continuing	Continuing	
Subtotal			-	-		12.949		14.158		-		14.158	Continuing	Continuing	N/A	
Project Cost Totals			-	-		14.715		15.619		-		15.619	Continuing	Continuing	N/A	
Remarks ALPS was previously funded under PE 0603327A.																

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	Project (Number/Name) 126 / <i>PEO Electronic Protect</i>	

Event Name	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
ALPS Prototype Development and Integration																												
ALPS Prototype Deployments																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	Project (Number/Name) 126 / <i>PEO Electronic Protect</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ALPS Prototype Development and Integration	1	2017	4	2022
ALPS Prototype Deployments	3	2019	4	2022

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Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev				Project (Number/Name) 146 / Air & Msl Defense Planning Control Sys			
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
146: Air & Msl Defense Planning Control Sys	-	23.405	12.656	8.392	-	8.392	2.912	1.227	3.402	3.197	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Missile Defense Planning and Control System (AMDPCS) provides integration of air and missile defense operations at all echelons. AMDPCS is comprised of the following major subsystems: Air Missile Defense Work Station (AMDWS) provides a correlated air picture using local radars, allowing the Commander the visibility and situational understanding of the airspace; other tools in AMDWS affords Soldiers horizontal and vertical collaborative planning with adjacent units. Air Defense System Integrator (ADSI) serves as a joint tactical datalink gateway/air picture. Forward Area Air Defense (FAAD), correlates the joint and local air picture and when displayed on AMDWS, provides a near real time, three dimensional air picture for the Commander. Joint Tactical Terminal (JTT) provides Soldiers Theater Ballistic Missile (TBM) early warning allowing them to take appropriate actions. AMDPCS are currently fielded to Army Air and Missile Defense Commands (AAMDC), Air Defense Artillery Brigades, (ADA BDE), Air Missile Defense Battalions (AMD BN) and Terminal High Altitude Area Air Defense Batteries (THAAD BTRY). Air Defense Airspace Management (ADAM), a variant of AMDPCS are fielded to Corps, Divisions, Brigade Combat Teams (BCTs) and multi-functional support brigades. As part of the capability and technology reuse, AMDWS external interfaces are being leveraged by Integrated Battle Command System (IBCS) to avoid redevelopment of existing capabilities. AMDWS and FAAD C2 are core components of the Counter Rocket Artillery Mortar (C-RAM) system-of- systems currently deployed in combat zones.

FY 2021 Base dollars in the amount of \$8.392 million fund engineering, development, testing, and certification of AMDWS software, as well as accreditation of AMDPCS family-of-systems shelters and software.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: AMDWS Software Development	13.929	10.820	7.612	-	7.612
Description: Supports LandWarNet, Common Operating Environments (COE), and Defense Information Systems Agency (DISA) architecture framework. AMDWS software engineering and development ensures interoperability and integration with maneuver battle command elements. AMDWS will interface with Integrated Air and Missile Defense (IAMD) and serves as a planning tool for the system-of-systems, as well as providing external interfaces.					
FY 2020 Plans: Continue AMDWS software engineering consistent with COE requirements. Upgrade the Windows 10 compliant version of AMDWS with BitLocker encryption features and replace all Windows 7 AMDWS. Perform COE integration activities with both RTSCE CE and CP CE. Continue software interoperability modifications with					

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>C2BMC, C2IS, C2AOS, AOC WS, Patriot, IBCS, THAAD, C-RAM C2, TBMCS, COE, and ABCS to support warfighter functions. Build threat sets and weapon platform capabilities for Counter-Unmanned Aerial Systems (C-UAS) planning and defense design capabilities to support the C-RAM C-UAS planning requirements.</p> <p>FY 2021 Base Plans: Maintain interoperability with COE, Integrated Tactical Network (ITN), and DISA requirements. Enhance capabilities, ensure continued interoperability with Army, Joint, and Coalition planning systems in order to support warfighter functions, and maintain cyber compliance. Support engineering and improvements to threat sets and weapon platform capabilities for C-UAS planning and defense design, and provide expanded integration with Integrated Air and Missile Defense Battle Command System (IBCS). Will also provide the ability to employ a non-tactical workstation, connected to a distant server.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 adjustment due to program progression through life cycle.</p>					
<p>Title: Passive Identification, Friend or Foe (PIFF)</p> <p>Description: Reduce the risk of fratricide by using position and identification data from self-reporting aircraft, to include UAS, within 250 nautical miles.</p>	6.902	-	-	-	-
<p>Title: Engineering, Development, Test and Evaluation</p> <p>Description: Ensure interoperability and cyber compliance through engineering, development, test, and evaluation of the AMDPCS family-of-systems shelter objective configurations; execute evaluation and finalization of the AMDPCS tactical communications, data processing, and vehicle/shelter/power generation/environmental system block upgrade program for fielded systems.</p> <p>FY 2020 Plans: Continue evaluations of emerging technologies and hardware interoperability. Continue support and development of IBCS-ADAM COE configurations. Analyze system hardware to ensure equipment meets Army requirements IAW command post directed requirement, 14 December 17. Test and evaluate replacement equipment needed to maintain cyber and command post directed requirement compliance. This effort's funding will be executed by the AMDPCS program.</p> <p>FY 2021 Base Plans:</p>	1.825	0.947	0.529	-	0.529

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue evaluations and development of emerging technologies and hardware to ensure network and cyber compliance. Continue support, development, and evaluation of IBCS-ADAM COE configurations, ensuring equipment meets Army requirements IAW command post-directed requirement, 14 December 2017. FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 adjustment due to program progression through life cycle.					
Title: Software System Certification Testing, Accreditation, and Approval of Authority-to-Operate (ATO) Description: Accomplish software system certification testing, accreditation, and approval of ATOs for the various software systems; BitLocker encryption and other authorized/approved G6 software implementation; Army and joint integration and interoperability assessments. FY 2020 Plans: Continue software systems certification testing, accreditation, and approval of ATOs as required by the DOD risk management framework process. Continue Army and joint integration and interoperability assessments. FY 2021 Base Plans: Conduct one Army Interoperability Certification (AIC) for each of the AMDPCS software sub-systems (AMDWS, ADSI, and CDS3), leading to ATO re-accreditation and Full Material Release (FMR), ensuring Army, joint, and coalition integration and interoperability compliance. FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 adjustment due to program life cycle changes.	0.749	0.314	0.251	-	0.251
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	-	0.575	-	-	-
Accomplishments/Planned Programs Subtotals	23.405	12.656	8.392	-	8.392

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) 146 / Air & Msl Defense Planning Control Sys
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• AD5070: AIR & MSL Defense Planning & Control Sys	29.913	39.061	47.374	15.143	62.517	68.778	102.399	-	-	0.000	302.668
• 149: Counter-Rockets, Artillery & Mortar	14.785	6.131	0.908	-	0.908	-	-	-	-	Continuing	Continuing
• H30503: Rocket, Artillery, Mortar (RAM) Warn	34.393	-	0.000	-	0.000	-	-	-	-	0.000	34.393
• H30504: C-RAM Enhancements	6.304	9.127	10.069	-	10.069	6.817	-	-	-	0.000	32.317
• DU3: IFPC2	10.324	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• 0605457A: Army Integrated Air and Missile Defense (AIAMD)	318.850	208.638	193.929	-	193.929	63.678	33.162	94.758	74.936	0.000	987.951
• BZ5075: IAMD Battle Command System	-	29.629	201.587	-	201.587	353.561	416.995	413.356	417.415	Continuing	Continuing
• E10: Sentinel	37.847	95.720	109.259	-	109.259	116.381	65.512	69.343	30.849	Continuing	Continuing
• FG5: Counter Unmanned Aerial Systems (UAS)	170.775	-	18.732	27.000	45.732	42.489	38.493	20.995	13.495	0.000	331.979
• H30505: Counter Unmanned Aerial Systems (C-UAS) Efforts	250.800	20.000	0.000	37.000	37.000	-	-	-	-	0.000	307.800
• 0604117A: Maneuver - Short Range Air Defense (M-SHORAD)	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	0.000	1,189.856

Remarks

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

D. Acquisition Strategy

The acquisition strategy relies on non-development items (NDI) and evolutionary software development to rapidly meet the demands of air defense battle management command, control, communications, computers, and intelligence (BM/C4I) requirements and to keep pace with automated information technologies. The concept of evolutionary software development will be accomplished in a series of AMDWS block releases and upgrades. AMDPCS is being developed for both the Army's Active and Reserve components.

The existing AMDWS software development contract is sole source (SS)/cost plus fixed fee (CPFF) to Northrop Grumman. Follow-on contracts will be fixed priced competitive efforts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) 146 / Air & Msl Defense Planning Control Sys
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration	Various	Various : Various	32.099	1.170	Dec 2018	0.757	Dec 2019	0.839	Dec 2020	-		0.839	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.575		-		-		-	0.000	0.575	-
Subtotal			32.099	1.170		1.332		0.839		-		0.839	Continuing	Continuing	N/A

Remarks
Not Applicable

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AMDWS Software Development and Engineering	SS/CPFF	Northrop Grumman : Huntsville AL	154.859	13.462	Oct 2018	10.319	Oct 2019	6.739	Oct 2020	-		6.739	Continuing	Continuing	Continuing
PIFF Development Engineering	C/FFP	Telephonics : Farmingdale NY	7.913	6.427	Apr 2019	-		-		-		-	0.000	14.340	-
ADSI Software Development and Engineering	SS/T&M	Ultra Electronics : Austin, TX	6.859	-		-		-		-		-	0.000	6.859	-
Developmental Engineering	Various	Various : Various	44.350	2.104	Dec 2018	0.885	Dec 2019	0.755	Dec 2020	-		0.755	Continuing	Continuing	Continuing
Subtotal			213.981	21.993		11.204		7.494		-		7.494	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Certification/Testing	Various	JITC : Ft Huachuca, AZ	1.322	0.111	Feb 2019	0.051	Feb 2020	0.025	Feb 2021	-		0.025	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev				Project (Number/Name) 146 / Air & Msl Defense Planning Control Sys							
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperability Assessment	Various	CTSF : Ft Hood, TX	1.730	0.131	May 2019	0.069	May 2020	0.034	May 2021	-		0.034	Continuing	Continuing	Continuing
Subtotal			3.052	0.242		0.120		0.059		-		0.059	Continuing	Continuing	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			249.132	23.405	12.656	8.392	-	8.392	Continuing	Continuing	N/A				
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) 146 / Air & Msl Defense Planning Control Sys

Event Name	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
AMDWS Block V Contract	[Redacted]																											
AMDWS Block VI Contract													[Redacted]															
AMDWS AMD Interfaces: C2BMC, Kessel Run, AOC WS, etc	[Redacted]																											
Passive Identification, Friend or Foe (PIFF) Eng./Integration	[Redacted]																											
AMDWS Software Certification Test (SCT) 7.0.2																												
AMDWS Army Interoperability Certification (AIC) 7.0.2																												
AMDWS AIC 7.0.3																												
AMDWS AIC 7.0.4																												
AMDWS AIC 8.0																												
AMDWS AIC 8.0.1																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	Project (Number/Name) 146 / <i>Air & Msl Defense Planning Control Sys</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
AMDWS Block V Contract	2	2011	4	2021
AMDWS Block VI Contract	1	2022	2	2026
AMDWS AMD Interfaces: C2BMC, Kessel Run, AOC WS, etc	4	2012	4	2030
Passive Identification, Friend or Foe (PIFF) Eng./Integration	4	2018	1	2022
ADSI Software Engineering Development and Test	1	2006	4	2017
AWA 16.1 (COE ADAM) DOTMLPF Eval / NIE 16.2	4	2015	4	2017
Army Warfighting Assessment (AWA) 17.1 / NIE 17.2	4	2016	3	2017
Army Warfighting Assess. 18.1 / Network Integration Eval. 18.2	4	2017	3	2018
AMDWS Software Certification Test (SCT) 7.0.2	3	2019	4	2019
AMDWS Army Interoperability Certification (AIC) 7.0.2	1	2020	3	2020
AMDWS AIC 7.0.3	1	2021	3	2021
AMDWS AIC 7.0.4	1	2022	3	2022
AMDWS AIC 8.0	1	2024	3	2024
AMDWS AIC 8.0.1	1	2025	3	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev					Project (Number/Name) 149 / Counter-Rockets, Artillery & Mortar		
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
149: Counter-Rockets, Artillery & Mortar	-	14.785	6.131	0.908	-	0.908	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems detects RAM launches, provides localized warning to the defended area, intercepts rounds in flight, and enhances response to and defeat of enemy forces. C-RAM combines multi-service fielded and non-developmental item sensors, command and control (C2) equipment, warning systems, and a modified U.S. Navy intercept system (Land-based Phalanx Weapon System [LPWS]), all connected via a wireless local area network. The Forward Area Air Defense Command and Control (FAAD C2) system integrates the sensors, weapons, and warning systems to provide C2 for the C-RAM system-of-systems. FAAD C2 software correlates the RAM sensor data, evaluates the threat, provides early warning, directs engagements, and cues counterfire systems and reaction forces. FAAD C2 employs an agile software development strategy, with Urgent Materiel Releases (UMR) every six months and Full Materiel Releases (FMR) every 15-18 months. Base RDT&E supports FAAD C2 basic Air Defense functionality and incorporation of new Link-16 messaging.

FY 2021 Base RDT&E dollars in the amount of \$0.908 million support FAAD C2 development and enhancements based on changes in threat (e.g., air track algorithm and battle manager improvements) and incorporate Link-16 Military Standard updates.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: FAAD C2 Software Development and Enhancements	1.785	1.080	0.908	-	0.908
Description: Funds system-of-systems development and upgrades based on the bi-annual release of the Integrated Air and Missile Defense (IAMD) Validated Online Lifecycle Threat (VOLT) and changes in threat, integration of emerging requirements from external PMs (Mission Command) and other services/agencies, technology insertions (Internet Protocol-based communications), and interoperability requirements (joint interoperability, military standard, information assurance compliance, external interface updates). Provides development and regression testing to ensure C-RAM C2 enhancements do not negatively impact the performance of the C-RAM system-of-systems. Includes continued development of electronic warfare capabilities to counter evolving threats. Includes product assurance and further incorporation of new Link-16 messaging.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020			
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	Project (Number/Name) 149 / <i>Counter-Rockets, Artillery & Mortar</i>				
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Support role-based user interface, initiate development of advanced battle manager and data link manager with external link forwarding and on-the-move command and control. This effort's funding will be executed by the FAAD/C-RAM program.						
FY 2021 Base Plans: Support FAAD C2 development and enhancements based on changes in threat (e.g., air track algorithm and battle manager improvements) and incorporate Link-16 Military Standard updates.						
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 adjustment due to Army requirements.						
Title: FY 2020 SBIR/STTR Transfer		-	0.051	-	-	-
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638						
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
Accomplishments/Planned Programs Subtotals		1.785	1.131	0.908	-	0.908
		FY 2019	FY 2020			
Congressional Add: All-Digital Radar Development		8.000	-			
FY 2019 Accomplishments: All-Digital Radar Development						
Congressional Add: C-RAM Network Security Enhancements		5.000	-			
FY 2019 Accomplishments: C-RAM Network Security Enhancements						
Congressional Add: Multi-Layered Tactical Protection System		-	5.000			
FY 2020 Plans: Multi-Layered Tactical Protection System						
Congressional Adds Subtotals		13.000	5.000			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) 149 / Counter-Rockets, Artillery & Mortar
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• H30503: Rocket, Artillery, Mortar (RAM) Warn	34.393	-	0.000	-	0.000	-	-	-	-	0.000	34.393
• H30504: C-RAM Enhancements	6.304	9.127	10.069	-	10.069	6.817	-	-	-	0.000	32.317
• 146: Air & Msl Defense Planning Control Sys	23.405	12.656	8.392	-	8.392	2.912	1.227	3.402	3.197	Continuing	Continuing
• AD5070: AIR & MSL Defense Planning & Control Sys	29.913	39.061	47.374	15.143	62.517	68.778	102.399	-	-	0.000	302.668
• DU3: IFPC2	10.324	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• S40: Army Integrated Air and Missile Defense	318.850	208.638	193.929	-	193.929	63.678	33.162	94.758	74.936	Continuing	Continuing
• BZ5075: IAMD Battle Command System	-	29.629	201.587	-	201.587	353.561	416.995	413.356	417.415	Continuing	Continuing
• E10: Sentinel	37.847	95.720	109.259	-	109.259	116.381	65.512	69.343	30.849	Continuing	Continuing
• L86: LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)	4.036	4.913	5.375	-	5.375	2.764	3.427	4.553	4.844	Continuing	Continuing
• L88: Enhanced AN/TPQ 36	5.447	12.381	14.633	-	14.633	8.953	9.440	10.031	8.512	Continuing	Continuing
• B05201: Lightweight Counter Mortar Radar	6.107	5.400	5.332	-	5.332	6.520	5.762	9.888	12.788	Continuing	Continuing
• B05310: AN/TPQ-53 Counterfire Target Acquisition Radar	324.150	16.416	72.421	-	72.421	11.829	29.868	41.921	53.408	Continuing	Continuing
• FG5: Counter Unmanned Aerial Systems (UAS)	170.775	-	18.732	27.000	45.732	42.489	38.493	20.995	13.495	Continuing	Continuing
• H30505: Counter Unmanned Aerial Systems (C-UAS) Efforts	250.800	20.000	0.000	37.000	37.000	-	-	-	-	Continuing	Continuing
• 0604117A: Maneuver - Short Range Air Defense (M-SHORAD)	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	0.000	1,189.856

Remarks

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

D. Acquisition Strategy

The C-RAM program is following an evolutionary acquisition strategy for rapid fielding of mature technology to the user. The objective of the strategy is to balance needs, available technology, and resources to quickly provide a robust capability to engage RAM threats. Multiple C-RAM systems have transitioned to acquisition programs,

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	Project (Number/Name) 149 / <i>Counter-Rockets, Artillery & Mortar</i>

including C-RAM Intercept, which fields existing LPWS guns to two Indirect Fire Protection Capability/Avenger battalions, and RAM Warn, which provides early, localized warning to all maneuver brigade combat teams. Development and upgrade of FAAD/C-RAM C2 software, to include enhanced capability to support emerging mission command requirements, technology insertion, and interoperability, is accomplished through a five-year CPIF contract awarded to Northrop Grumman Mission Systems.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)						Project (Number/Name)					
2040 / 5				PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev						149 / Counter-Rockets, Artillery & Mortar					
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Administration	Various	Various : Various	26.602	0.149	Nov 2018	0.085	Nov 2019	0.073	Nov 2019	-		0.073	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.051		-		-		-	0.000	0.051	-
Subtotal			26.602	0.149		0.136		0.073		-		0.073	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
C-RAM C2 Development and Enhancements	C/CPIF	Northrop Grumman : Redondo Beach, CA	106.589	0.900	Apr 2019	1.012	Apr 2020	0.835	Apr 2021	-		0.835	Continuing	Continuing	Continuing
Secure Communications	SS/CPFF	Northrop Grumman : Huntsville, AL	9.578	-		-		-		-		-	0.000	9.578	-
Secure Communications (Next Gen)	C/CPFF	Northrop Grumman : Huntsville, AL	10.000	5.000	Sep 2019	-		-		-		-	0.000	15.000	-
All-Digital Radar Development	C/FFP	Raytheon Company : Andover, MA	8.000	8.000	Aug 2019	-		-		-		-	Continuing	Continuing	Continuing
LPWS Enhancements	C/CPIF	Raytheon Company : Tucson, AZ	10.307	-		-		-		-		-	0.000	10.307	-
Multi-Layered Tactical Protection System	C/FFP	TBD : TBD	-	-		4.983	Sep 2020	-		-		-	0.000	4.983	-
Subtotal			144.474	13.900		5.995		0.835		-		0.835	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Miscellaneous Test Support	Various	Various : Various	23.968	0.242	Jan 2019	-		-		-		-	Continuing	Continuing	Continuing

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) 149 / Counter-Rockets, Artillery & Mortar

Event Name	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				
FAAD C2 Development	FAAD C2 Development, Updates, Virtualization & Integration w/IAMD																															
C-RAM Enhancements - Development, Integration & Test	Network Security Enhance, All-Digital Radar, Multi-Layered Tactical Protect Sys																															
LPWS Sp. 6.4.3.1 and FAAD C2 v5.6A-2.2 UMR	▲ 1																															
FAAD C2 v5.6A-2.4 UMR	▲ 2																															
FAAD C2 v5.6B System Certification Test (SCT)	■																															
Army Interoperability Certification (AIC) T11.24 (v5.6B)	■																															
Joint Interoperability Test (JIT) 20-02 (V5.6C)					■																											
FAAD C2 v5.6A Full Materiel Release (FMR)					▲ 3																											
FAAD C2 v5.6A-2.4p2 Rapid Acquisition Authority (OFS/OIR)					▲ 4																											
AIC 20.2 (v5.6C)					■																											
FAAD C2 v5.6C SCT									■																							
FAAD C2 v5.6B FMR													▲ 5																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	Project (Number/Name) 149 / <i>Counter-Rockets, Artillery & Mortar</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
C-RAM C2 v5.5C-2.0 Full Materiel Release (FMR)	2	2016	2	2016
FAAD C2 Development	1	2013	4	2021
C-RAM Directed Enhancements - Integration & Test	1	2012	4	2017
C-RAM Enhancements - Development, Integration & Test	1	2016	4	2021
LPWS Sp. 6.4.1 Urgent Materiel Release (UMR)	4	2017	4	2017
C-RAM C2 v5.5C-2.2p3 Full Software Release	3	2018	3	2018
C-RAM C2 v5.6A-1.0p1.1 and v5.6A-1.0p3 Urgent Materiel Release (UMR)	4	2018	4	2018
LPWS Sp. 6.4.3.1 and FAAD C2 v5.6A-2.2 UMR	2	2019	2	2019
FAAD C2 v5.6A-2.4 UMR	3	2019	3	2019
FAAD C2 v5.6B System Certification Test (SCT)	3	2019	3	2019
Army Interoperability Certification (AIC) T11.24 (v5.6B)	4	2019	4	2019
Joint Interoperability Test (JIT) 20-02 (V5.6C)	1	2020	2	2020
FAAD C2 v5.6A Full Materiel Release (FMR)	1	2020	1	2020
C-RAM C2 v5.5C-2.0 Full Materiel Release (FMR)	2	2016	2	2016
C-RAM Intercept Operational Assessment (OA)	2	2015	2	2015
C-RAM Intercept (LPWS Spiral 6.0) Materiel Release	3	2016	3	2016
FAAD C2 v5.6A-2.4p2 Rapid Acquisition Authority (OFS/OIR)	1	2020	1	2020
AIC 20.2 (v5.6C)	2	2020	2	2020
FAAD C2 v5.6C SCT	4	2020	4	2020
FAAD C2 v5.6B FMR	1	2021	1	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev					Project (Number/Name) FG5 / Counter Unmanned Aerial Systems (UAS)		
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
FG5: Counter Unmanned Aerial Systems (UAS)	-	170.775	0.000	18.732	27.000	45.732	42.489	38.493	20.995	13.495	0.000	331.979
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Counter-Unmanned Aircraft Systems (C-UAS) effort is in response to Joint Urgent Operational Need (JUON) CC-0558 to support identification, development, testing, evaluation, and integration of technologies to provide an overall evolutionary capability to defeat small UAS threats at 89 U.S. Central Command (USCENTCOM) sites. The C-UAS effort provides warfighters the ability to comprehensively detect, track, identify, and defeat enemy Groups 1 and 2 lightweight, low altitude, commercial off-the-shelf (COTS) UAS platforms with kinetic/non-kinetic means.

FY 2021 Base dollars in the amount of \$18.732 million will support detection capability enhancements using a common command and control.

FY 2021 OCO dollars in the amount of \$27.000 million support technological development to keep pace with evolving threats.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Counter-UAS Capability Development	170.775	-	18.732	27.000	45.732
Description: Development, integration, and test of electronic warfare and kinetic kill defeat options for the Low-slow-small UAS Integrated Defeat System (LIDS).					
FY 2021 Base Plans: FY 2021 Base funding will support detection capability enhancements using a common command and control.					
FY 2021 OCO Plans: Develop new electronic warfare mitigation techniques for LIDS, to keep pace with evolving UAS threats.					
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 OCO funds increase due to continuing C-UAS mission requirements.					
Accomplishments/Planned Programs Subtotals	170.775	-	18.732	27.000	45.732

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) FG5 / Counter Unmanned Aerial Systems (UAS)
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• H30505: <i>Counter Unmanned Aerial Systems (C-UAS) Efforts</i>	250.800	20.000	0.000	37.000	37.000	-	-	-	-	0.000	307.800

Remarks

D. Acquisition Strategy

The Acquisition Strategy for the C-UAS JOUN CC-0558 includes deploying interim capabilities followed by spiral enhancements. The interim capability seeks to leverage, modify and/or integrate existing technologies into a System of System (SoS) solution capable of identifying, tracking, and defeating current known threats. Spiral development efforts will increase capabilities using mature technologies developed by industry partners to augment and/or replace the interim solution. All systems fielded will be tested to identify capabilities and limitations, which will be used to deliver training and support solutions for deploying hardware. In order to keep the solutions abreast of rapidly emerging adversarial UAS threats, this effort will continuously seek industry technology advances which could result in technology upgrades making these systems capable against emerging threats.

During the period FY 2018 - 2020, a baseline System of System will be fielded to fulfill JOUN CC-0558 needs. Beginning in FY21, RDTE effort will focus on technical refreshes which will keep pace with emerging threats.

The C-UAS effort utilizes multiple contract vehicles, types, and vendors.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev				FG5 / Counter Unmanned Aerial Systems (UAS)							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Various : Various	21.870	9.930	Dec 2018	-		1.686		2.374	Nov 2020	4.060	Continuing	Continuing	-
Subtotal			21.870	9.930		-		1.686		2.374		4.060	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Fixed/Mobile System Development	Various	Various : Various	47.529	37.620	Jan 2019	-		0.000		21.144	Jan 2021	21.144	Continuing	Continuing	-
Kinetic Defeat Development	Various	Various : Various	110.703	28.250	May 2019	-		-		-		-	Continuing	Continuing	-
Sensor Development	Various	Various : Various	36.955	57.484	Jun 2019	-		-		-		-	Continuing	Continuing	-
C-UAS C2 Software Development	C/CPIF	Northrop Grumman : Redondo Beach, CA	22.611	7.879	Apr 2019	-		14.611	Apr 2021	-		14.611	Continuing	Continuing	-
Dismounted/Handheld Systems Development	Various	Various : Various	15.899	3.123		-		-		-		-	Continuing	Continuing	-
Subtotal			233.697	134.356		-		14.611		21.144		35.755	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support	Various	Various : Various	38.133	26.489	Aug 2019	-		2.435		3.482	Jan 2021	5.917	0.000	70.539	-
Subtotal			38.133	26.489		-		2.435		3.482		5.917	0.000	70.539	N/A
Project Cost Totals			293.700	170.775		0.000		18.732		27.000		45.732	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev	Project (Number/Name) FG5 / Counter Unmanned Aerial Systems (UAS)

Event Name	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
C-UAS Emerging Threat Development																												
LIDS System-of-Systems (SoS) Record Test																												
E-LIDS/M-LIDS Inc 1 Engineering Test																												
LIDS Advanced Position, Navigation & Timing (PNT) Test																												
E-LIDS/M-LIDS Inc 1 Record Test																												
Inc 1 SoS Record Test																												
FY20 Summer Test																												
Bi-Annual Test Events (Winter & Summer)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i>	Project (Number/Name) FG5 / <i>Counter Unmanned Aerial Systems (UAS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
C-UAS Emerging Threat Development	1	2017	4	2025
Mobile LIDS (M-LIDS) Inc 1 Testing and Downselect	1	2018	1	2018
Expeditionary LIDS (E-LIDS) Engineering and Record Test	2	2018	2	2018
M-LIDS Inc 1 Engineering and Record Test	3	2018	4	2018
LIDS System-of-Systems (SoS) Record Test	4	2018	1	2019
E-LIDS/M-LIDS Inc 1 Engineering Test	3	2019	3	2019
LIDS Advanced Position, Navigation & Timing (PNT) Test	4	2019	4	2019
E-LIDS/M-LIDS Inc 1 Record Test	1	2020	1	2020
Inc 1 SoS Record Test	1	2020	1	2020
FY20 Summer Test	3	2020	3	2020
Bi-Annual Test Events (Winter & Summer)	1	2021	4	2025