Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army											Date: February 2018	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604741A *I Air Defense Command, Control and Intelligence - Eng Dev*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	200.205	28.726	95.172	119.300	214.472	15.577	9.310	2.915	29.489	Continuing	Continuing
126: *PEO Electronic Protect*	-	16.419	0.000	0.000	-	0.000	0.000	0.000	0.000	28.261	0.000	44.680
146: *Air & Msl Defense Planning Control Sys*	-	14.987	24.306	24.326	-	24.326	14.300	8.401	2.915	1.228	Continuing	Continuing
149: *Counter-Rockets, Artillery & Mortar*	-	24.899	4.420	1.846	-	1.846	1.277	0.909	0.000	0.000	Continuing	Continuing
FG5: *Counter Unmanned Aerial Systems (CUAS)*	-	143.900	0.000	69.000	119.300	188.300	0.000	0.000	0.000	0.000	0.000	332.200

A. Mission Description and Budget Item Justification

The Advanced Electronic Protection Enhancement (AEPE) Program funds efforts to assess and initiate development of solutions to Army Air and Missile Defense (AMD) vulnerabilities from Advanced Electronic Attack (AEA). Army AMD sensors, Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS) Command and Control (C2), and Radio Frequency (RF) data and voice networks will be assessed against current and postulated AEA systems and techniques. Potential Electronic Protection (EP) solutions developed by the Army will be demonstrated and assessed in live and simulated AEA environments. Similarly, EP solutions developed by the Joint services and other Agencies (e.g., the Missile Defense Agency) will also be assessed for potential incorporation into Army AMD systems.

The Air and Missile Defense Planning and Control System (AMDPCS) is an Army Objective Force System that provides integration of Air and Missile Defense (AMD) operations at all echelons. AMDPCS systems are deployed with Air Defense Artillery (ADA) Brigades (BDEs), Army Air and Missile Defense Commands (AAMDCs), and Air Defense and Airspace Management (ADAM) Cells at the Brigade Combat Teams (BCT's), Multi Functional Support Brigades and Divisions/Corps. AMDPCS systems also provide air defense capabilities to Homeland Defense systems. ADAM Cells provide the Commander at BCTs, BDEs and Divisions with air defense situational awareness and airspace management capabilities. They also provide the interoperability link with Joint, multinational and coalition forces. AMDPCS components are vital in the transformation of ADA units and the activation of the Air & Missile Defense (AMD) Battalions. AMDPCS has three major components: (1) The Air and Missile Defense Workstation (AMDWS) is an automated defense and staff planning tool that displays the common tactical and operational 3-dimensional air picture. AMDWS is the air picture provider for the Army, producing an integrated and correlated air picture at all tactical levels and locations. AMDWS is also an integral component of Integrated Base Defense. AMDWS provides an interoperability link to multinational air defense forces; (2) The Air Defense System Integrator (ADSI) is a communications data link processor and display system that provides near-real time, 3-dimensional and joint airspace situational awareness; (3) The Army Air Defense shelter configurations use automated data processing equipment, tactical communications, Common Hardware Systems, standard vehicles and tactical power to provide AMD unit commanders and staffs with the capabilities to plan missions, direct forces, and manage airspace. The integration of the Passive Identification, Friend or Foe (PIFF) capability into sheltered systems enables AMDPCS to track self-reporting aircraft. PIFF receives position and identification data from self-reporting aircraft, to include UAS, within 250 nautical miles.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604741A *I Air Defense Command, Control and Intelligence - Eng Dev*

The Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems (SoS) is an evolutionary, non-developmental program that detects RAM launches; provides localized warning to the defended area, with sufficient time for personnel to take appropriate action; intercepts rounds in flight, thus preventing damage to ground forces or facilities; and enhances response to and defeat of enemy forces. The C-RAM capability is comprised of a combination of multi-service fielded and non-developmental item (NDI) sensors, command and control (C2) equipment, a commercial industry-produced warning system, 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, also under the management of the C-RAM Program Directorate, provides the C-RAM C2 functionality and has been enhanced to integrate the sensors, weapons, and warning systems for the C-RAM SoS. C-RAM C2 software correlates RAM sensor data, evaluates the threat, provides early warning, directs engagements, and cues counterfire systems and reaction forces. The C-RAM SoS capability is currently deployed at multiple sites in Afghanistan and Iraq providing correlated air and ground pictures to the Army Mission Command and the Joint Defense Networks, and using various forms of communications to provide situational awareness and exchange of timely and accurate information to synchronize and optimize automated Shape, Sense, Warn, Intercept, Respond, and Protect decisions.

Multiple acquisition efforts are associated with the C-RAM program, including C-RAM Intercept, which fields existing LPWS guns to two Indirect Fire Protection Capability (IFPC)/Avenger composite Battalions, and RAM Warn, a horizontal technology insertion, using current C-RAM warning capability to provide early, localized warning to all Maneuver Brigade Combat Teams (BCT).

The Counter-Unmanned Aircraft Systems (C-UAS) capability is being developed in response to a Joint Operational Needs (JUON), CC-0558 approved by the Joint Rapid Acquisition Cell (JRAC) in June 2016. Project FG5 was created in FY 2017 to support the identification, development, testing, evaluation and integration of technologies to provide an overall evolutionary capability to defeat small Unmanned Aircraft Systems (UAS) threats. The C-UAS system will provide the capability for the warfighter to comprehensively detect, track, identify and defeat enemy Groups 1 and 2 light weight, Commercial Off-The-Shelf (COTS) UAS. The C-UAS system development involves a phased development and testing approach of C-UAS systems.

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	205.432	28.726	28.320	-	28.320
Current President's Budget	200.205	28.726	95.172	119.300	214.472
Total Adjustments	-5.227	0.000	66.852	119.300	186.152
• Congressional General Reductions	-0.025	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	5.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.002	-			
• Adjustments to Budget Years	-	-	66.852	119.300	186.152
• RAA not appropriated	-8.200	-	-	-	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604741A *I Air Defense Command, Control and Intelligence - Eng Dev*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2017	FY 2018
Project: 149: *Counter-Rockets, Artillery & Mortar*		
Congressional Add: *C-RAM Capability Enhancement - Network Security Enhancements (Next Gen)*	5.000	-
Congressional Add Subtotals for Project: 149	5.000	-
Congressional Add Totals for all Projects	5.000	-

Change Summary Explanation

FY 2017 funding adjustment of -$5.227 million includes a reduction of $8.200 million originally requested in the Request for Additional Appropriations (RAA) for Passive Identification, Friend or Foe (PIFF) system engineering (including cyber, data at rest, and a new Identification Friend or Foe (IFF) Response Processor (IRP) card design), a $5.000 million Congressional add for C-RAM network security enhancements, -$2.002 million for SBIR/STTR, and -$0.025 million for FFRDC.

The FY 2019 base funding adjustment of +$66.852 million includes an increase of $69.000 million to C-UAS in support of JUON CC-0558, a rephasing of $1.886 million to C-RAM to account for the availability of prior year execution balances and a reduction of $0.262 million to AMDPCS due to revised economic assumptions.

FY 2019 OCO funding adjustment of +$119.300 million supports C-UAS JUON CC-0558.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
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*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
126: *PEO Electronic Protect*	-	16.419	0.000	0.000	-	0.000	0.000	0.000	0.000	28.261	0.000	44.680
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Electronic Protection Enhancement (AEPE) Program funds efforts to assess and initiate development of solutions to Army Air and Missile Defense (AMD) vulnerabilities from Advanced Electronic Attack (AEA). Army AMD sensors, Integrated Air and Missile Defense (IAMD) Battle Command System (IBCS) Command and Control (C2), and Radio Frequency (RF) data and voice networks will be assessed against current and postulated AEA systems and techniques. Potential Electronic Protection (EP) solutions developed by the Army will be demonstrated and assessed in live and simulated AEA environments. Similarly, EP solutions developed by the Joint services and other Agencies (e.g., the Missile Defense Agency) will also be assessed for potential incorporation into Army AMD systems.

The initial assessment event was conducted in 2QFY15. Subsequent events will be conducted approximately every two (2) years. Analysis and implementation that provide AEA solutions will occur between events and will be assessed at the next event after implementation.

The following tasks were developed based on previous AEPE demonstration results and the following planned activities will assess the AEA impacts on AMD components and development of countermeasures. The tasks for AEPE are: (1) Plan and execute periodic AEPE demonstrations with Army AMD systems and perform post-demonstration analysis. Integrate Joint service and other Agency AMD systems into AEPE demonstrations as appropriate. (2) Upon completion of AEPE demonstration analyses, create EP concepts to mitigate Army AMD sensor, C2, and RF data link vulnerabilities. (3) Develop EP tools for use by Army AMD systems to improve overall system performance in AEA environments. (4) Develop effects-based AEA Modeling and Simulation (M&S) to assess Army AMD EP concepts in Hardware-In-The-Loop (HWIL) environment. (5) Continue to collaborate with United States Strategic Command (USSTRATCOM) Joint Electromagnetic Preparedness for Advanced Combat (JEPAC) to evaluate, modify, and field existing Army AMD EP Tactics, Techniques, and Procedures (TTPs) in a Joint environment. Evaluate and modify applicable Joint EP TTPs for use in Army AMD systems. (6) Continually interface with intelligence communities to maintain cognizance of emerging AEA threats and incorporate these threats in future AEPE demonstrations. (7) Develop a time-phased EP roadmap that identifies the investments needed to improve the EP capabilities of Army AMD sensors, C2, and RF data and voice networks.

The AEPE effort crosses all AMD System efforts of which only a portion is Air Defense Command and Control.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Advanced Electronic Protection Enhancements	16.419	-	-	-	-
Description: Funding is provided for conduct of AEPE planning efforts, conduct of demonstrations and post-mission analysis.					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Accomplishments/Planned Programs Subtotals	16.419	-	-	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Not applicable for this item.

D. Acquisition Strategy

Not applicable for this item.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Other Government Agencies & Government Program Management	Various	Various : Various	2.252	0.692	Nov 2016	-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	2.252	0.692		-		-		-		-	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Integration Assessment	Various	Various : Various	1.218	2.013	Dec 2016	-		-		-		-	Continuing	Continuing	Continuing
Concept Solutions	Various	Various : Various	1.531	3.905	Dec 2016	-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	2.749	5.918		-		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Component Assessments & Research and Trade Studies	Various	Various : Various	5.137	3.918	Feb 2017	-		-		-		-	Continuing	Continuing	Continuing
Modeling and Simulation	Various	Various : Various	3.377	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	8.514	3.918		-		-		-		-	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Demonstration Planning and Execution	Various	Various : Various	-	5.891	Nov 2016	-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	-	5.891		-		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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*	

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	13.515	16.419		0.000		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
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*

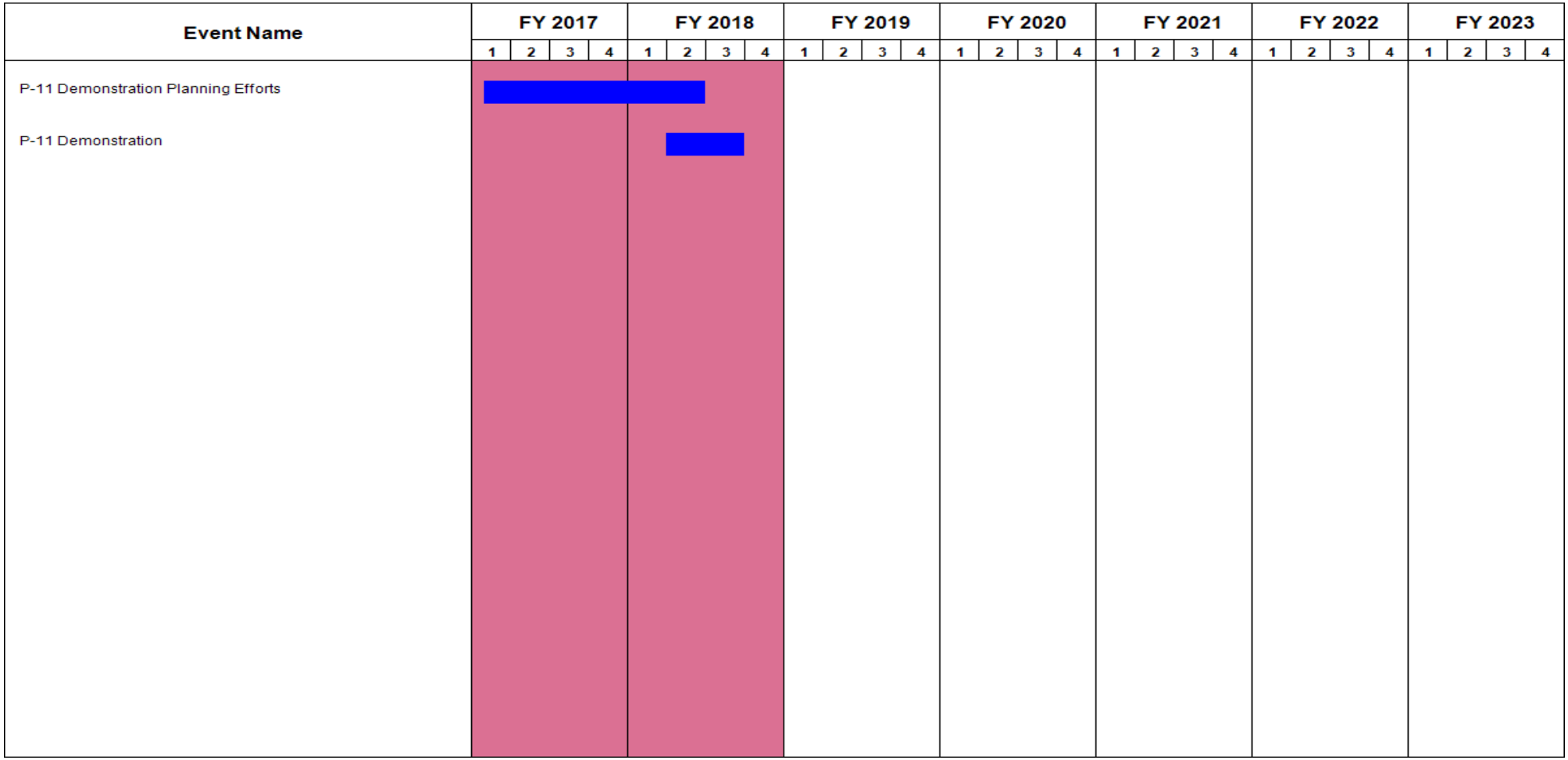

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev*	**Project (Number/Name)** 126 / *PEO Electronic Protect*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
P-11 Demonstration Planning Efforts	1	2017	2	2018
P-11 Demonstration	2	2018	3	2018

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
146: *Air & Msl Defense Planning Control Sys*	-	14.987	24.306	24.326	-	24.326	14.300	8.401	2.915	1.228	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air and Missile Defense Planning and Control System (AMDPCS) is an Army Objective Force System that provides integration of Air and Missile Defense (AMD) operations at all echelons. AMDPCS systems are deployed with Air Defense Artillery (ADA) brigades, Army Air and Missile Defense Commands (AAMDCs), and Air Defense and Airspace Management (ADAM) Cells at the Brigade Combat Teams (BCT's), Multi Functional Support Brigades and Divisions/Corps. AMDPCS systems also provide air defense capabilities to Homeland Defense systems. ADAM Cells provide the Commander at BCTs, Brigades and Divisions with air defense situational awareness and airspace management capabilities. They also provide the interoperability link with Joint, multinational and coalition forces. AMDPCS components are vital in the transformation of ADA units and the activation of the AMD Battalions. AMDPCS has three major components: (1) The Air and Missile Defense Workstation (AMDWS) is an automated defense and staff planning tool that displays the common tactical and operational three dimensional air picture. AMDWS is the air picture provider for the Army, producing an integrated and correlated air picture at all tactical levels and locations. AMDWS is also an integral component of Integrated Base Defense. AMDWS provides an interoperability link to multinational air defense forces; (2) The Air Defense System Integrator (ADSI) is joint data link communications processor and display system that provides near-real time, three dimensional and joint airspace situational awareness for AMD forces; (3) The Army Air Defense shelter configurations use automated data processing equipment, tactical communications, Common Hardware Systems, standard vehicles and tactical power to provide AMD unit commanders and staffs with the capabilities to plan missions, direct forces, and manage airspace. The integration of the Passive Identification, Friend or Foe (PIFF) capability into sheltered systems enables AMDPCS to track self-reporting aircraft. PIFF receives position and identification data from self-reporting aircraft, to include UAS, within 250 nautical miles.

$24.326M FY 2019 funds the development, software engineering, testing and certification of AMDWS and PIFF software; Engineering, development, test and evaluation of the AMDPCS Family of Shelter (FoS) subsystems; and Software system certification testing, accreditation, and approval of authority-to-operate (ATO).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: AMDWS Software Development	11.767	12.882	13.359	-	13.359
Description: AMDWS development and support of LandWarNet as well as various Common Operating Environments (COEs). AMDWS software engineering and development are consistent with COE requirements, evolving the air and missile defense planning and control requirements to a net-centric environment, and fulfilling the air defense force operations capabilities identified in the AMD TRADOC capabilities requirement list. Virtualize AMDWS software development and rehost onto COE Real-Time Computing Environment common					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
hardware systems. Support the evolving development of the Force Operations portion of the Integrated Air and Missile Defense (IAMD) System of Systems. ***FY 2018 Plans:*** Continue AMDWS software engineering consistent with Capability Set 17-18 / COE v3 requirements. Integrate COE AMDWS version, which is the initial Server-client Capability. Integrate the COE AMDWS with the ADAM. Implement interface to the Cooperative Aircraft Surveillance System (CASS) in support of commercial aircraft de-confliction. ***FY 2019 Base Plans:*** Continue AMDWS software engineering consistent with Capability Set 17-18 / COE v3 requirements. Finalize development of a Windows 10 version of AMDWS, test, and work material release for fielding to replace all Windows 7 AMDWS. Support COE v3 integration activities with both Real Time Safety Critical Embedded Computing Environment (RTSCE CE) and Command Post Computing Environment (CP CE). Continue to implement interface to the Passive Identification, Friend or Foe (PIFF) in support of commercial aircraft de-confliction. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 adjustment due to revised economic assumptions.					
Title: Passive Identification, Friend or Foe (PIFF) ***Description:*** PIFF receives position and identification data from self-reporting aircraft, to include UAS, within 250 nautical miles. ***FY 2018 Plans:*** Continue system engineering which includes cyber, data at rest, and a new IFF Response Processor (IRP) Card design. This non-recurring engineering effort will support the development of the fielded product for the AMDPCS and Integrated Air and Missile Defense Battle Command Systems (IBCS). CASS components such as the IRP Card will be used to resolve obsolescence issues on the TPX family of Identification Friend or Foe (IFF) interrogators fielded with Patriot, Sentinel, and Air Traffic Navigation and Control Systems (ATNAVICS). ***FY 2019 Base Plans:*** Continue system engineering which includes cyber, data at rest, and a new IFF Response Processor (IRP) Card design. This non-recurring engineering effort will support the development of a common product for AMDPCS and Integrated Air and Missile Defense Battle Command Systems (IBCS). PIFF components such as the	-	8.200	8.211	-	8.211

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
IRP Card will be used to resolve obsolescence issues on the TPX family of Identification Friend or Foe (IFF) interrogators fielded with Patriot, Sentinel, and Air Traffic Navigation and Control Systems (ATNAVICS). ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 adjustment due to revised economic assumptions.					
Title: ADSI Software Engineering and Development ***Description:*** ADSI software engineering and development of next software baseline (post-v15.0.4), including testing and certification of capabilities for TacView Situational Awareness, with air control support, scenario generation and three dimensional display across various tactical data links. Version 15.0.4 software upgrades the ADSI OS to use Windows 7 and Red Hat Linux. FY17 completes ADSI version 15.0.4 software development and test activities, including certification.	0.313	-	-	-	-
Title: Engineering, Development, Test and Evaluation ***Description:*** Engineering, development, test, and evaluation of the AMDPCS Family of Shelter (FoS) subsystems objective configuration; evaluation and finalization of the AMDPCS tactical communications, data processing and vehicle/shelter/power generation/environmental system block upgrade program for fielded systems. ***FY 2018 Plans:*** Continue evaluations of emerging technologies and obsolescence. Continue support and development of IBCS-ADAM COE configurations and CASS integration/testing at NIE 18.1, 18.2, 19.1 and 19.2. ***FY 2019 Base Plans:*** Continue evaluations of emerging technologies and hardware interoperability. Continue support and development of IBCS-ADAM COE configurations and PIFF integration/testing at NIE 19.1, 19.2, 20.1 and 20.2. Assess system to ensure equipment meets Army requirements IAW Command Post Directed Requirement, 14 Dec 17. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 adjustment due to revised economic assumptions.	1.993	2.227	1.905	-	1.905
Title: Software System Certification Testing, Accreditation, and Approval of Authority-to-Operate (ATO)	0.914	0.997	0.851	-	0.851

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Description: Software system certification testing, accreditation, and approval of ATOs for the various software systems, pursuit of approval of the Host Based Security System (HBSS), SolidCore or other authorized / approved G6 software; Army and Joint integration and interoperability assessments. ***FY 2018 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 2019 Base 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 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 adjustment due to revised economic assumptions.					
Accomplishments/Planned Programs Subtotals	14.987	24.306	24.326	-	24.326

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• AD5070: *AD5070, AMDPCS*	126.539	35.735	33.837	-	33.837	24.983	49.385	68.021	63.273	Continuing	Continuing
• 149: *PE 0604741A, Proj 149, Counter-Rockets, Artillery & Mortar*	24.899	4.420	1.846	-	1.846	1.277	0.909	-	-	Continuing	Continuing
• H30503: *SSN H30503, Rocket, Artillery, Mortar (RAM) Warn (Parent is IFPC Family of Systems: BZ0501)*	39.680	11.380	4.131	0.262	4.393	-	-	-	-	0.000	55.453
• H30504: *SSN H30504, C-RAM Enhancements (Parent is IFPC Family of Systems: BZ0501)*	57.907	-	12.609	-	12.609	9.127	0.703	-	-	0.000	80.346
• DU3: *PE 06043019A, Proj DU3, IFPC (FY12 PE0603305A IFPC II - Intercept)*	-	11.303	51.030	-	51.030	146.731	132.361	156.732	21.528	Continuing	Continuing
• BZ5075: *SSN BZ5075, IAMD Battle Command System*	-	-	0.000	-	0.000	72.307	323.680	428.572	497.974	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• E10: *PE 0604820A, Proj E10, Sentinel*	15.368	32.968	39.338	-	39.338	91.534	96.427	80.394	43.874	Continuing	Continuing
• FG5: *PE 0604741A, Proj FG5, Counter Unmanned Aerial Systems (C-UAS)*	143.900	-	69.000	119.300	188.300	-	-	-	-	0.000	332.200
• H30505: *SSN H30505, Counter Unmanned Aerial Systems (C-UAS)*	139.750	67.500	30.000	250.800	280.800	10.000	-	-	-	0.000	498.050

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.

AMDWS software development is contracted Sole Source (SS)/Cost Plus Fixed Fee (CPFF) to Northrop Grumman. PIFF development will be competitively awarded.

AMDWS is a prime component of C-RAM. It provides the Forward Operating Base (FOB) commander with clearance of fires display and enemy munitions flight paths.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Administration	Various	Various : Various	29.814	1.142	Dec 2016	1.094	Dec 2017	1.216	Dec 2018	-		1.216	Continuing	Continuing	Continuing
		Subtotal	29.814	1.142		1.094		1.216		-		1.216	Continuing	Continuing	N/A

Remarks

Not Applicable

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AMDWS Software Development and Engineering	SS/CPFF	Northrop Grumman : Huntsville AL	132.036	11.615	Oct 2016	13.208	Oct 2017	12.893	Oct 2018	-		12.893	Continuing	Continuing	Continuing
PIFF Development Engineering	C/TBD	To Be Determined : To Be Determined	-	-		6.806	Dec 2017	6.804	Dec 2018	-		6.804	Continuing	Continuing	Continuing
ADSI Software Development and Engineering	SS/T&M	Ultra Electronics : Austin, TX	6.811	0.048	Feb 2017	-		-		-		-	0.000	6.859	-
Developmental Engineering	Various	Various : Various	39.536	2.046	Dec 2016	2.883	Dec 2017	3.092	Dec 2018	-		3.092	Continuing	Continuing	Continuing
		Subtotal	178.383	13.709		22.897		22.789		-		22.789	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Certification/Testing	Various	JITC : Ft Huachuca, AZ	1.127	0.055	Feb 2017	0.146	Feb 2018	0.148	Feb 2019	-		0.148	Continuing	Continuing	Continuing
Interoperability Assessment	Various	CTSF : Ft Hood, TX	1.486	0.081	May 2017	0.169	May 2018	0.173	May 2019	-		0.173	Continuing	Continuing	Continuing
		Subtotal	2.613	0.136		0.315		0.321		-		0.321	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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*	

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	210.810	14.987		24.306		24.326		-		24.326	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
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*

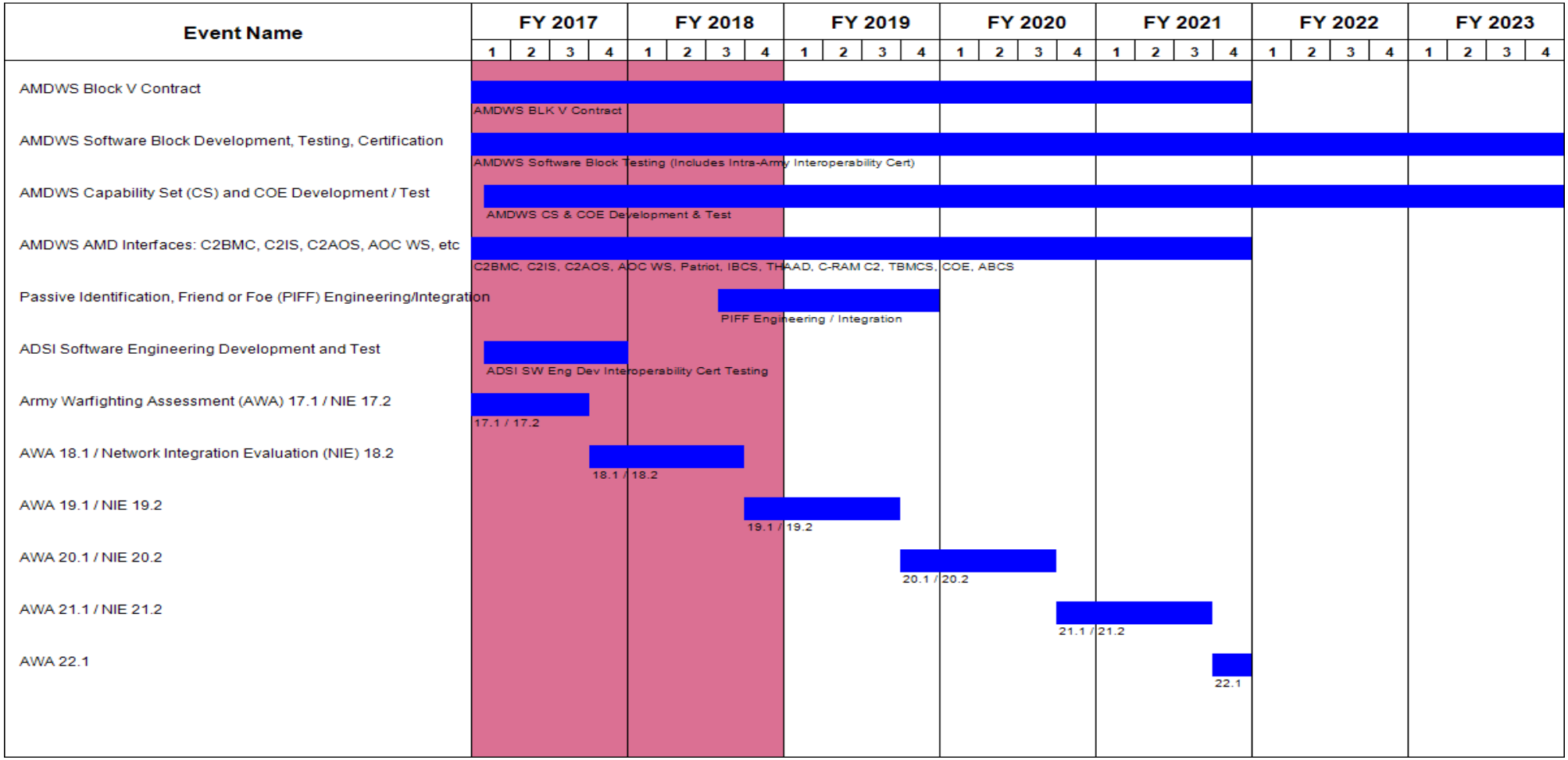

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev*	**Project (Number/Name)** 146 / *Air & Msl Defense Planning Control Sys*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
AMDWS Block V Contract	2	2011	4	2021
AMDWS Software Block Development, Testing, Certification	3	2007	4	2023
AMDWS Capability Set (CS) and COE Development / Test	1	2013	4	2023
AMDWS AMD Interfaces: C2BMC, C2IS, C2AOS, AOC WS, etc	4	2012	4	2021
Passive Identification, Friend or Foe (PIFF) Engineering/Integration	3	2018	4	2019
ADSI Software Engineering Development and Test	1	2005	4	2017
AWA 16.1 (COE ADAM) DOTMLPF Eval / NIE 16.2	4	2015	3	2016
Army Warfighting Assessment (AWA) 17.1 / NIE 17.2	4	2016	3	2017
AWA 18.1 / Network Integration Evaluation (NIE) 18.2	4	2017	3	2018
AWA 19.1 / NIE 19.2	4	2018	3	2019
AWA 20.1 / NIE 20.2	4	2019	3	2020
AWA 21.1 / NIE 21.2	4	2020	3	2021
AWA 22.1	4	2021	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
149: *Counter-Rockets, Artillery & Mortar*	-	24.899	4.420	1.846	-	1.846	1.277	0.909	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 (SoS) is an evolutionary, non-developmental program that detects RAM launches; provides localized warning to the defended area, with sufficient time for personnel to take appropriate action; intercepts rounds in flight, thus preventing damage to ground forces or facilities; and enhances response to and defeat of enemy forces. The C-RAM capability is comprised of a combination of multi-service fielded and non-developmental item (NDI) sensors, command and control (C2) equipment, a commercial industry-produced warning system, 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, also under the management of the C-RAM Program Directorate, provides the C-RAM C2 functionality and has been enhanced to integrate the sensors, weapons, and warning systems for the C-RAM SoS. C-RAM C2 software correlates RAM sensor data, evaluates the threat, provides early warning, directs engagements, and cues counterfire systems and reaction forces. The C-RAM SoS capability is currently deployed at multiple sites in Afghanistan, Iraq, and Egypt, providing correlated air and ground pictures to the Army Mission Command and the Joint Defense Networks, and using various forms of communications to provide situational awareness and exchange of timely and accurate information to synchronize and optimize automated Shape, Sense, Warn, Intercept, Respond, and Protect decisions.

The deployment of the C-RAM SoS was accomplished through an incremental acquisition process driven by urgent operational needs, theater priorities, and emerging capability requirements to provide a counter-RAM capability to combat forces. The C-RAM SoS approach was initially validated by a Proof of Principle demonstration in December 2004 and has undergone more than 25 Army Test and Evaluation Command (ATEC)-supported operational assessments to incorporate multiple improvements in response to changes in threat tactics and lessons learned. C-RAM capabilities are currently deployed to locations in support of Operation Freedom's Sentinel (OFS), Operation Inherent Resolve (OIR), and Task Force Sinai (TFS). Continuing C-RAM SoS improvement efforts, required to meet emerging theater requirements, include C2 and LPWS software upgrades as well as integration and deployment of Ku band Radio Frequency System (KuRFS) radars for an enhanced detection capability against stressing threats. Base RDTE funding for FY 2015 and beyond supports maintenance of C-RAM C2 basic Air Defense functionality. Support of the existing C-RAM SoS capability deployed in theater has been through the Overseas Contingency Operations (OCO) process.

Recent directed enhancements to the C-RAM SoS capability included use of Army tactical communications rather than commercial systems; integration of Warn functionality into the C2 workstation to reduce complexity and footprint; and integration with Unmanned Aircraft Systems (UAS) Universal Ground Control Station (UGCS) for enhanced situational awareness, combat identification, and response options. Additional enhancements include testing and upgrade of dynamic clearance of unplanned fires (DCUF) in conjunction with the Advanced Field Artillery Tactical Data System (AFATDS) V2 for rapid and enhanced response, integration of sensor communications and legacy systems, development and integration of C-RAM network security enhancements, and completion of an LPWS cruise missile capability study and modification development effort.

FY 2019 Base RDT&E dollars in the amount of $1.846 million provide C-RAM C2 development and enhancements.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: C-RAM C2 Software Development and Enhancements ***Description:*** Funds system-of-systems development and upgrades based on changes in threat, integration of emerging requirements from PMs within PEO MS as well as other PEOs (Aviation, Command Control Communications-Tactical (C3T), Intelligence Electronic Warfare & Sensors (IEWS), etc.) and other Services/ agencies, technology insertions (IP-based communications), and interoperability requirements (Joint interoperability, MIL Standard), and provides development and regression testing to ensure C-RAM C2 enhancements do not negatively impact the performance of the other C-RAM pillars (Shape, Sense, Warn, Intercept, Respond, and Protect). Includes Host Based Security System (HBSS)/SolidCore (Information Assurance compliance). ***FY 2018 Plans:*** Test and validate C-UAS interoperability requirements, continue Integrated Air and Missile Defense (IAMD) convergence, initiate Maneuver Short Range Air Defense (M-SHORAD) requirements planning, incorporate cyber security updates, and provide hardware and software upgrades to National Capital Region (NCR)/ Homeland Defense. ***FY 2019 Base Plans:*** Implement C-UAS and M-SHORAD initiatives and continue IAMD convergence and strategic planning. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 base funding was reduced to account for the availability of prior year execution balances.	4.455	4.420	1.846	-	1.846
Title: Dynamic Clearance of Unplanned Fires (DCUF) ***Description:*** Software enhancement within C-RAM C2 that provides automated airspace assessments to the Advanced Field Artillery Tactical Data System (AFATDS), enabling safer and more rapid clearance of artillery fires at the Brigade level. DCUF enables more effective engagements of unplanned targets, while reducing the risk of aerial fratricide in the prosecution of fire missions.	6.701	-	-	-	-
Title: C-RAM Capability Enhancement - LPWS Cruise Missile Capability Study ***Description:*** Funds capability enhancements to increase the overall effectiveness of the C-RAM system-of-systems through completion of an LPWS cruise missile capability study and modification development efforts.	8.743	-	-	-	-
Accomplishments/Planned Programs Subtotals	19.899	4.420	1.846	-	1.846

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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*

	FY 2017	FY 2018
Congressional Add: C-RAM Capability Enhancement - Network Security Enhancements (Next Gen)	5.000	-
FY 2017 Accomplishments: N/A		
Congressional Adds Subtotals	5.000	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• H30503: *SSN H30503, Rocket, Artillery, Mortar (RAM) Warn (Parent is IFPC Family of Systems: BZ0501)*	39.680	11.380	4.131	0.262	4.393	-	-	-	-	0.000	55.453
• H30504: *SSN H30504, C-RAM Enhancements (Parent is IFPC Family of Systems: BZ0501)*	57.907	-	12.609	-	12.609	9.127	0.703	-	-	0.000	80.346
• 146: *PE 0604741A, Proj 146, Air & Missile Defense Planning and Control System*	14.987	24.306	24.326	-	24.326	14.300	8.401	2.915	1.228	Continuing	Continuing
• AD5070: *SSN AD5070, Air & Missile Defense Planning and Control System*	126.539	35.735	33.837	-	33.837	24.983	49.385	68.021	63.273	Continuing	Continuing
• DU3: *PE 0604319A, Proj DU3, IFPC2 (FY12 PE0603305A IFPC II - Intercept)*	-	11.303	51.030	-	51.030	146.731	132.361	156.732	21.528	Continuing	Continuing
• S40: *PE 0605457A, Proj S40, Army Integrated Air and Missile Defense (AIAMD)*	273.240	336.420	277.607	-	277.607	200.275	130.860	63.741	33.196	Continuing	Continuing
• BZ5075: *SSN BZ5075, IAMD Battle Command System*	-	-	0.000	-	0.000	72.307	323.680	428.572	497.974	Continuing	Continuing
• E10: *PE 060482A, Proj E10, Sentinel*	15.368	32.968	39.338	-	39.338	91.534	96.427	80.394	43.874	Continuing	Continuing
• L86: *PE 0604823A, Proj L86, Lightweight Counter Mortar Radar (LCMR)*	3.064	2.136	4.194	-	4.194	4.913	5.379	3.459	4.288	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• L88: *PE 0604823A, Proj L88, Enhanced AN/TPQ-36*	3.113	7.469	5.662	-	5.662	8.245	8.914	9.132	9.624	0.000	52.159
• B05201: *SSN B05201, Lightweight Counter Mortar Radar (LCMR)*	125.145	20.459	9.165	-	9.165	-	-	8.326	7.380	Continuing	Continuing
• B05310: *SSN B05310, Enhanced AN/TPQ-36*	297.509	329.057	162.121	165.200	327.321	11.120	5.972	6.279	30.244	Continuing	Continuing
• FG5: *PE 0604741A, Proj FG5, Counter Unmanned Aerial Systems (C-UAS)*	143.900	-	69.000	119.300	188.300	-	-	-	-	Continuing	Continuing
• H30505: *SSN H30505, Counter Unmanned Aerial Systems (C-UAS) Efforts*	139.750	67.500	30.000	250.800	280.800	10.000	-	-	-	Continuing	Continuing

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. Both C-RAM Intercept (LPWS) and RAM Warn have transitioned to acquisition programs and continue to capitalize on RDTE investments (e.g., reuse/repurpose of Navy interceptor, Future Combat Systems (FCS) sensor technology development for Ku band Radio Frequency System (KuRFS) radar, etc.). Development and upgrade of 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 in April 2015 to Northrop Grumman Mission Systems.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Administration	Various	Various : Various	24.373	1.876	Nov 2016	0.353		0.149	Nov 2018	-		0.149	Continuing	Continuing	Continuing
		Subtotal	24.373	1.876		0.353		0.149		-		0.149	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
C-RAM C2 Development and Enhancements	C/CPIF	Northrop Grumman : Redondo Beach, CA	95.844	8.795	Apr 2017	2.120		0.895	Apr 2019	-		0.895	Continuing	Continuing	Continuing
Secure Communications	SS/CPFF	Northrop Grumman : Huntsville, AL	9.578	-		-		-		-		-	0.000	9.578	-
Secure Communications (Next Gen)	C/CPFF	TBD : TBD	-	5.000	Mar 2018	-		-		-		-	0.000	5.000	-
LPWS Enhancements	C/CPIF	Raytheon Company : Tucson, AZ	3.500	6.807	Aug 2017	-		-		-		-	0.000	10.307	-
		Subtotal	108.922	20.602		2.120		0.895		-		0.895	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Miscellaneous Test Support	Various	Various : Various	20.973	2.421	Nov 2016	0.574		0.242	Jan 2019	-		0.242	Continuing	Continuing	Continuing
End-to-End Modeling & Simulation	SS/CPFF	Northrop Grumman : Redondo Beach, CA	12.748	-		1.373		0.560	Sep 2019	-		0.560	0.000	14.681	-
		Subtotal	33.721	2.421		1.947		0.802		-		0.802	Continuing	Continuing	N/A

	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	167.016	24.899		4.420		1.846		-		1.846	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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*	

	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
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*

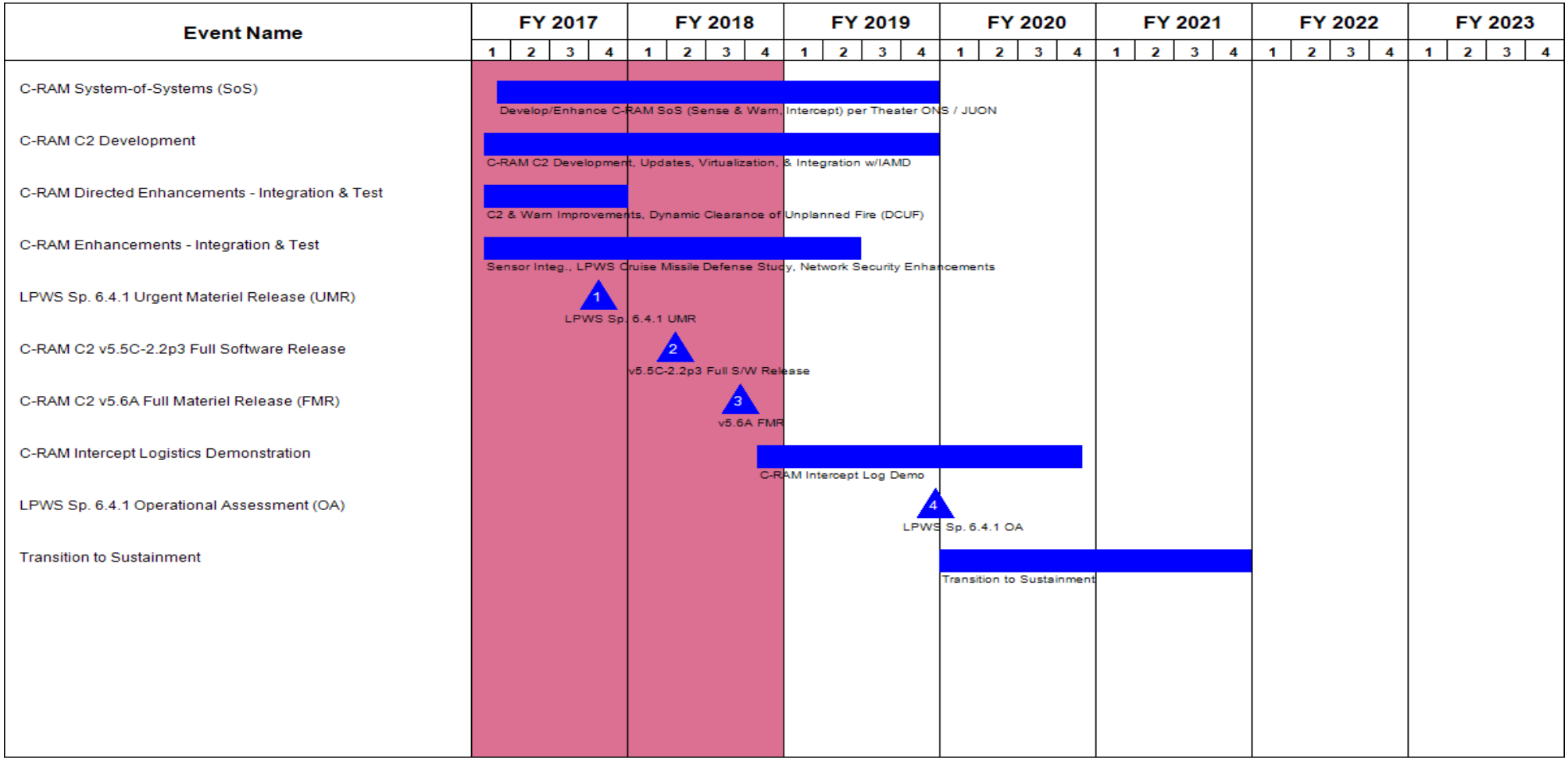

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev*	**Project (Number/Name)** 149 / *Counter-Rockets, Artillery & Mortar*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
C-RAM System-of-Systems (SoS)	1	2007	4	2019
C-RAM C2 Development	1	2013	4	2019
C-RAM Directed Enhancements - Integration & Test	1	2012	4	2017
C-RAM Enhancements - Integration & Test	1	2016	2	2019
LPWS Sp. 6.4.1 Urgent Materiel Release (UMR)	4	2017	4	2017
C-RAM C2 v5.5C-2.2p3 Full Software Release	2	2018	2	2018
C-RAM C2 v5.6A Full Materiel Release (FMR)	3	2018	3	2018
C-RAM Intercept Logistics Demonstration	4	2018	4	2020
LPWS Sp. 6.4.1 Operational Assessment (OA)	4	2019	4	2019
Transition to Sustainment	1	2020	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
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 (CUAS)*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FG5: *Counter Unmanned Aerial Systems (CUAS)*	-	143.900	0.000	69.000	119.300	188.300	0.000	0.000	0.000	0.000	0.000	332.200
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

For transparency and in support of the Counter Unmanned Aircraft System (C-UAS) Joint Operational Needs (JUON) CC-0558, Project FG5 was created in FY 2017 to support the identification, development, testing, evaluation and integration of technologies to provide an overall evolutionary capability to defeat small Unmanned Aircraft System (UAS) threats. The C-UAS effort will provide the capability for the warfighter to comprehensively detect, track, identify and defeat enemy Groups 1 and 2 light weight, low altitude Commercial Off-The-Shelf (COTS) UAS. The C-UAS effort involves a phased development and testing approach to spiral capability into CENTCOM. The incremental approach provides interim standalone capability within the first few months and achieves a full networked capability by end of the JUON period.

FY 2019 Base dollars in the amount of $69.000 million and FY 2019 OCO dollars in the amount of $119.300 million provides improvement to previously fielded material solutions to enhance capability to detect, track, identify and defeat enemy Groups 1 and 2 light weight, low altitude COTS UAS. Efforts include development, integration, and testing of kinetic, or hard kill, defeat solutions into Low-slow-small UAS Integrated Defeat System (LIDS): 1) development of Coyote medium range seeker; 2) development of lightweight flat panel radar; 3) increase range of mobile gun weapon; and 4) development and integration of multi-function Electronic Warfare (EW) with full On-The-Move (OTM) capability.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Counter UAS Engineering and Dismounted Options ***Description:*** Perform system engineering, testing, integration, and overall support of the C-UAS JUON. Supports test events to inform modifications to deployed and planned systems as well as inform procurement decisions for dismounted systems.	78.700	-	-	-	-
Title: Counter UAS Kinetic Kill Defeat Options ***Description:*** Development, integration, and test of electronic warfare and kinetic kill defeat options for small UAS Integrated Defeat System. ***FY 2019 Base Plans:*** Develop, integrate, and test kinetic, or hard kill, defeat solutions into the Low-slow-small UAS Integrated Defeat System (LIDS): 1) develop Coyote medium range seeker; 2) develop lightweight flat panel radar; 3) increase	65.200	-	69.000	119.300	188.300

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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 (CUAS)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
range of mobile gun weapon; and 4) develop and integrate multi-function Electronic Warfare (EW) with full On-The-Move (OTM) capability. ***FY 2019 OCO Plans:*** Develop, integrate, and test kinetic, or hard kill, defeat solutions into the Low-slow-small UAS Integrated Defeat System (LIDS): 1) develop Coyote medium range seeker; 2) develop lightweight flat panel radar; 3) increase range of mobile gun weapon; and 4) develop and integrate multi-function Electronic Warfare (EW) with full On-The-Move (OTM) capability. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 increase funds development and testing to provide improved C-UAS capabilities for evolving threats in support of the expansion of JUON CC-0558 which increases the number of CENTCOM sites requiring protection from 18 sites to 90 sites.					
Accomplishments/Planned Programs Subtotals	143.900	-	69.000	119.300	188.300

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• Rapid Acquisition Authority (RAA) 1: *Rapid Acquisition Authority (RAA) 1 for Baseline Plan. Source: FY 2017 OCO OMA*	65.500	-	0.000	-	0.000	-	-	-	-	0.000	65.500
• Rapid Acquisition Authority (RAA) 2: *Rapid Acquisition Authority (RAA) 2 for Acceleration Plan. Source: FY 2017 OCO OMA*	76.000	-	0.000	-	0.000	-	-	-	-	0.000	76.000
• H30505: *SSN H30505, C-UAS OPA OCO*	139.750	67.500	30.000	250.800	280.800	10.000	-	-	-	0.000	498.050

Remarks

All funding supports Counter Unmanned Aircraft System (C-UAS) Joint Operational Needs (JUON) CC-0558.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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 (CUAS)*

D. Acquisition Strategy

The C-UAS program is executing an acquisition strategy for rapid fielding of emerging technology and initial fielding to selected sites in CENTCOM. In Phase 1a testing of mature solutions and down selecting was made for entry criteria in Phase 2 which will test fully networked, fixed/mobile capability, sustainable solution and deploy full capability to identified locations. C-UAS is rapidly developing, integrating and deploying materiel solution through contracts awarded January 2017 to Syracuse Research Corporation (SRC) and June 2017 to DRS Sustainment Systems, Inc.

C-UAS will hold four distinct 1 month-long test events in FY19. The events will test system of systems C-UAS approach resulting in four spiral hardware/software development efforts. C-UAS improved capabilities will be delivered incrementally each quarter as they are ready for deployment.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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 (CUAS)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Various : Various	-	12.640	Mar 2017	-		3.547		6.383	Dec 2018	9.930	0.000	22.570	-
		Subtotal	-	12.640		-		3.547		6.383		9.930	0.000	22.570	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Counter UAS Systems Development	Various	Various : Various	-	112.451	Jun 2017	-		54.924		94.957	Jan 2019	149.881	0.000	262.332	-
		Subtotal	-	112.451		-		54.924		94.957		149.881	0.000	262.332	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support	Various	Various : Various	-	18.809	Jun 2017	-		10.529		17.960	May 2019	28.489	0.000	47.298	-
		Subtotal	-	18.809		-		10.529		17.960		28.489	0.000	47.298	N/A

	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	143.900		0.000		69.000		119.300		188.300	0.000	332.200	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
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 (CUAS)*

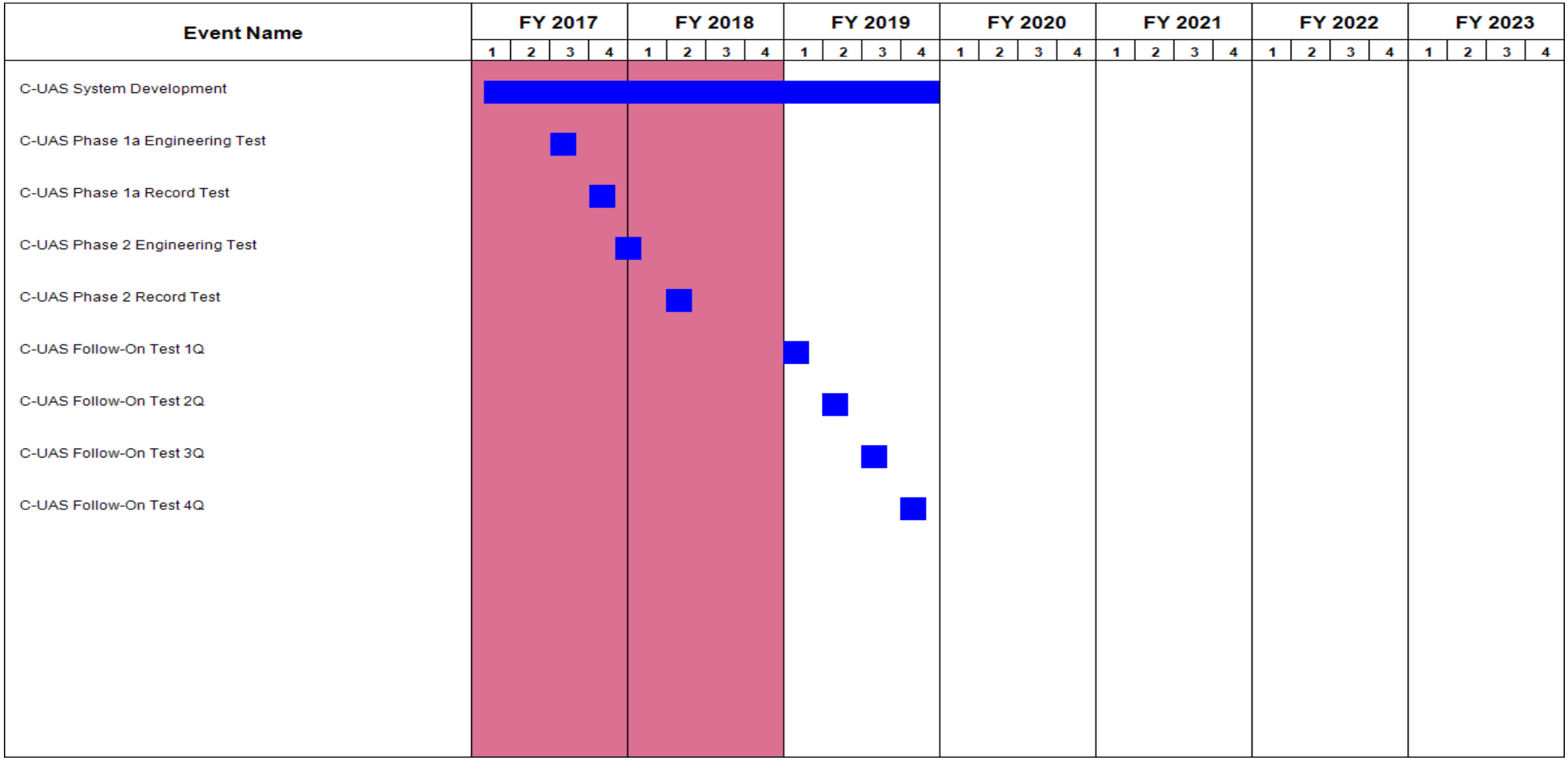

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604741A / *Air Defense Command, Control and Intelligence - Eng Dev*	**Project (Number/Name)** FG5 / *Counter Unmanned Aerial Systems (CUAS)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
C-UAS System Development	1	2017	4	2019
C-UAS Phase 1a Engineering Test	3	2017	3	2017
C-UAS Phase 1a Record Test	4	2017	4	2017
C-UAS Phase 2 Engineering Test	4	2017	1	2018
C-UAS Phase 2 Record Test	2	2018	2	2018
C-UAS Follow-On Test 1Q	1	2019	1	2019
C-UAS Follow-On Test 2Q	2	2019	2	2019
C-UAS Follow-On Test 3Q	3	2019	3	2019
C-UAS Follow-On Test 4Q	4	2019	4	2019