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 6: *RDT&E Management Support*					R-1 Program Element (Number/Name) PE 0604759A *I Major T&E Investment*							
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	-	93.668	102.901	82.996	-	82.996	104.789	76.867	79.231	80.469	Continuing	Continuing
983: *Reagan Test Site (RTS) T&E Investments*	-	6.762	7.213	7.312	-	7.312	7.346	7.534	7.757	7.902	Continuing	Continuing
984: *Major Developmental Testing Instrumentation*	-	42.641	29.692	25.257	-	25.257	35.396	36.135	37.285	43.227	Continuing	Continuing
986: *Major Operational Test Instrumentation*	-	17.311	18.990	12.845	-	12.845	14.628	14.832	15.288	15.508	Continuing	Continuing
EY9: *Range Radar Replacement Program (RRRP)*	-	25.320	42.006	23.148	-	23.148	47.419	18.366	18.901	13.832	Continuing	Continuing
FA4: *Warrior Injury Assessment Manikin (WIAMan)*	-	1.634	5.000	14.434	-	14.434	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) funds the development and acquisition of major developmental test instrumentation for the United States (U.S.) Army Test and Evaluation Command's (ATEC) test activities: White Sands Test Center (WSTC), NM; Yuma Test Center, (YTC), AZ; Aberdeen Test Center (ATC), MD; Electronic Proving Ground (EPG), AZ; Redstone Test Center (RTC), AL; and for the Reagan Test Site (RTS) at the U.S. Army Kwajalein Atoll (USAKA), which is managed by the Space and Missile Defense Command. This PE also funds development and acquisition of Operational Test Command's (OTC) major field instrumentation and the management of the Cyber Acquisition Blue Team program and certification standards. Requirements for instrumentation and cyber certifications are identified through a long range survey of project managers, Research Development and Engineering Centers (RDECs), and Battle Laboratories developing future weapon systems and the test programs that support these systems. Army testing facilities are also surveyed to determine major testing capability shortfalls.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 6: *RDT&E Management Support*	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	84.777	102.901	108.632	-	108.632
Current President's Budget	93.668	102.901	82.996	-	82.996
Total Adjustments	8.891	0.000	-25.636	-	-25.636
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	12.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.070	-			
• Adjustments to Budget Years	-	-	-25.636	-	-25.636
• FFRDC Transfer	-0.039	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2017	FY 2018
Project: 984: *Major Developmental Testing Instrumentation*		
Congressional Add: *Congressional Add for Cyber Vulnerabilities Research*	12.000	-
Congressional Add Subtotals for Project: 984	12.000	-
Congressional Add Totals for all Projects	12.000	-

Change Summary Explanation

Fiscal Year (FY) 2017 funding includes a $12 million Congressional Add for "Cyber Vulnerabilities Research." The FY 2019 funding request was reduced by $24.039 million to account for the availability of prior year execution balances.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 6	R-1 Program Element (Number/Name) PE 0604759A / *Major T&E Investment*	Project (Number/Name) 983 / *Reagan Test Site (RTS) T&E Investments*	

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
983: *Reagan Test Site (RTS) T&E Investments*	-	6.762	7.213	7.312	-	7.312	7.346	7.534	7.757	7.902	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds improvement and modernization (I&M) for the Ronald Reagan Ballistic Missile Defense Test Site (RTS). Funds modernization of the radar, telemetry, optics, range safety, communications, command/control and other equipment essential to meet test and evaluation requirements of the Services and Department of Defense (DoD) agencies. Without modernization these instrumentation systems face obsolescence or degraded capability. The RTS instrumentation is required to support data collection for test & evaluation assessments and operational decisions for the Army, Navy, Air Force, United States Strategic Command (STRATCOM), Missile Defense Agency (MDA), Defense Advanced Research Projects Agency (DARPA), National Aeronautics and Space Administration (NASA), and other customers. RTS, located in the Republic of the Marshall Islands, is a remote, secure activity of the Major Range and Test Facility Base (MRTFB).

Funding will enable RTS to continue to meet customer objectives and sustain the required instrumentation suite.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Radar Open Systems Architecture (ROSA) Refresh	0.600	0.900	-
Description: The ROSA Refresh plan is to incorporate subsystem technologies into the Ground-Based Radar Prototype (GBR-P), then transition those technologies to the other RTS sensors. Much of the testing and integration lessons will be learned ahead of time, providing a drop-in updated solution for legacy ROSA components at the other radars identified as having long-term sustainability issues. In this approach, the ROSA refresh effort is coupled with the GBR-P modernization leading to a cleaner and more cost-effective program.			
FY 2018 Plans: Integrate and test new ROSA sub-systems at GBR-K radar.			
FY 2018 to FY 2019 Increase/Decrease Statement: FY18 completes current refresh cycle. Program will resume in out years.			
Title: Radar Reliability Improvement Program (RRI).	0.300	0.300	0.500
Description: The Radar Improvement and Sustainment (RIS) activity is an Improvements and Modernizations (I&M) Umbrella Program to push technology into radar systems. RIS is a group of complimentary I&M Projects that mitigate annual Operations and Maintenance (O&M) risks. Projects initiated address the following needs: Enhancing the Reliability of the Sensor; Technology			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 983 / *Reagan Test Site (RTS) T&E Investments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Refresh; Obsolescence; Commonality of Design across Sensors; Enhanced Monitoring; Fault Detection ? Fault Isolation (FD/FI); Enable Remote Operation and Monitoring; and Enhanced Capabilities. ***FY 2018 Plans:*** Initiate new efforts to address O&M concerns and increase radar reliability. ***FY 2019 Plans:*** RRI Program will continue as an I&M umbrella Program to push technology into the radar systems. RRI projects will address: Enhancing the Reliability of the Sensor; Technology Refresh; Obsolescence; Commonality of Design across Sensors; Enhanced Monitoring; FD/FI; Enable Remote Operation and Monitoring; and Enhanced Capabilities. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** This is an umbrella I&M program that varies according to fund availability.			
Title: Telemetry (TM) Modernization Study. ***Description:*** This activity will develop the technology required to modernize the telemetry systems using an innovative software defined radio approach designed to vastly improve the ability to adapt to future telemetry changes and requirements quickly with lower cost. In addition, this approach will enable centralized command and control of the telemetry equipment increasing efficiency in mission preparation and execution. The telemetry backend processing chain is currently comprised of discrete frequency-specific hardware components that are replicated for each telemetry channel required for a test event. This activity will develop a scalable frequency-agnostic, software-based solution that runs on commodity computer servers. More complex missions (e.g., Over-the-air (OTA) operational testing of the Ballistic Missile Defense Systems (BMDS)) will continue to require more telemetry channels, but this activity will avoid much of that future cost. This effort will provide enough hardware to increase capacity of the telemetry system. ***FY 2018 Plans:*** Extend implementation to additional antenna sites at RTS. ***FY 2019 Plans:*** Complete Roi Island modernized TM equipment. Reach Initial Operating Capability for a single telemetry site. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase due to inflation	2.310	2.427	2.480
Title: Legacy Servo Upgrade Program.	0.272	-	1.460

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 983 / *Reagan Test Site (RTS) T&E Investments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: This activity will design, upgrade, and replace the radar and optics servo systems. The custom-hardware based legacy systems will be replaced with commercially supportable commercial off the shelf (COTS) hardware. Where possible, common components will be used across all range sensors to minimize ongoing maintenance costs. ***FY 2019 Plans:*** Assess condition of remaining antenna servo systems and determine highest priority servo replacement need and initiate engineering design activities for the next phase of the program. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** This is not a new start but continuation of a long term servo upgrade program. Phase 2 completed in FY17 and Phase 3 begins in FY19 based on funding availability.			
Title: RTS Automation and Decision Support. ***Description:*** As missions become more complex and challenging, operator workload increases significantly. This activity improves automation and decision support to reduce human operator workload and operator errors associated with a higher workload. There will be additional capabilities to operate the range as a cohesive meta-sensor with capabilities to program contingencies, react with a priori information and decision algorithms and resource brokers. This will improve mission assurance. The RTS radar control software will be upgraded to automate processes that computers do better than humans, and reduce the need for labor intensive tuning efforts. The human computer interface (HCI) for the radars will be improved to allow operators to interact with the RTS sensor suite more intuitively with a small set of high-level commands. The control center data fusion algorithms will be improved and streamlined to reduce complexity and decrease operator workload. ***FY 2018 Plans:*** Complete displays and control center automation scoped in FY17. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Program will be completed in FY18.	0.200	0.100	-
Title: Multi-Statics for Radars and Telemetry - Prototype ***Description:*** This development will enable all the existing Kiernan Reentry Measurements System (KREMS) radars to be used as illuminators and the RTS telemetry systems to be used as receivers in a multi-static array that will increase the sensitivity of the systems, reduce the need for high power operation in the systems, and in conjunction with the software radio radar project and the solid state transmitter project will allow the radars to be operated at a lower O&M cost. ***FY 2018 Plans:***	0.200	0.486	0.781

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 983 / *Reagan Test Site (RTS) T&E Investments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Continue design of a multi-static prototype and procure hardware to support the prototype. ***FY 2019 Plans:*** Continue development of multi-statics for KREMS Radars. Conduct initial proof of concept tests. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding increased for proof of concept testing of prototype designed in FY17/FY18.			
Title: Ground Based Discrimination Radar ***Description:*** The Ground Based Discrimination Radar activity will provide the RTS with an instrumentation-quality, X-band phased array radar to more robustly support customer mission requirements and provide a relatively cost-effective phased array technology test-bed capability. To control costs, the existing GBR-P, provided by the Missile Defense Agency and initially developed as the prototype fire control radar, will be upgraded. ***FY 2018 Plans:*** Integrate new sub-systems and backend processing onto the GBR-K radar on Kwajalein. ***FY 2019 Plans:*** Continue GBR upgrade external systems and infrastructure work. Begin integration of one super-sub-array. Planned initial connection to the RTS classified mission network. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY19 funds are for continued overhaul of the GBR and planned initial connection to the RTS classified network.	2.880	3.000	1.600
Title: RTS Cyber Threat Assessment and Mitigation ***Description:*** This is new start for FY19. Prototype and integrate a sidelobe canceller (to protect against electronic attack and radar jamming) for ALTAIR Ultra High Frequency (UHF) radar that has compatibility with other KREMs. ***FY 2019 Plans:*** System design review planned. Begin system development phase with yard antenna placement and integration. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Emerging need to prototype and integrate a Sidelobe Canceller (SLC) for ALTAIR UHF that has compatibility with other KREMS Radars.	-	-	0.491
Accomplishments/Planned Programs Subtotals	6.762	7.213	7.312

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 983 / *Reagan Test Site (RTS) T&E Investments*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 6	R-1 Program Element (Number/Name) PE 0604759A / *Major T&E Investment*	Project (Number/Name) 984 / *Major Developmental Testing Instrumentation*	

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
984: *Major Developmental Testing Instrumentation*	-	42.641	29.692	25.257	-	25.257	35.396	36.135	37.285	43.227	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and acquires major test instrumentation to perform developmental testing of weapon systems at U. S. Army Test and Evaluation Command's (ATEC) activities which include: Yuma Test Center (YTC), AZ; Aberdeen Test Center (ATC), MD; Electronic Proving Ground (EPG), AZ; White Sands Test Center (WSTC), NM; Redstone Test Center (RTC), AL.

Projects are designated as a major test program based on their visibility, assessed relative technical risk (medium-high), schedule risk, cost (greater than $1.5 Million per year or $7.5 Million for the total Project) and applicability to other mission areas or services. These Projects are technically demanding, state-of-the-art, unique instrumentation assets or suites to meet the technology shortfalls, and generally result from development programs managed by a professional project management team. FY19 funds will be used for modernization of outdated instrumentation in support of developmental testing for Army Department of Defense programs.

Electromagnetic Environmental Effects (E3) Electromagnetic Radiation Effects (EMRE) Systems Modernization will upgrade equipment at the White Sands Missile Range (WSMR) EMRE site where E3 testing is performed to evaluate survivability and vulnerability of military systems. This Project will upgrade and replace signal transmitters, refurbish an anechoic test chamber, replace data acquisition equipment and install a new turntable to support test items. Nuclear Effects Test Capabilities Modernization acquires and upgrades Special Test Equipment for nuclear facilities located at WSMR. These acquisitions and upgrades include the Pulse Current Injection Simulator, Prompt Gamma Simulator, Gamma Range Facility, Linear Electron Accelerator (LINAC), Semi-Conductor Test Lab, Electromagnetic Pulse and the Solar Furnace. Common Range Integrated Instrumentation System (CRIIS) Objective Program provides precision location instrumentation which will significantly increase the Test and Evaluation (T&E) ranges' capability to meet the test instrumentation needs of the tri-service range users. Test Network Modernization (TNM) will upgrade existing test data networks to ensure infrastructures are capable of providing reliable and secure transport of data and communications for ATEC test activities. Applied Environments Modernization (AEM) program will upgrade antiquated Environmental labs for climatic and dynamic testing with new cascade refrigeration units, climatic chambers, vibration test systems, x-ray cameras, a real-time radiography system and full spectrum solar lights. Future Wireless Network program (FWN) will procure and integrate wireless network technologies across ATEC test activities which will provide near real-time data collection support for Developmental Test and Operational Test events. Robotics/Unmanned Aerial Systems (UAS) Instrumentation Suite will develop and procure instrumentation for testing controlled and autonomous ground and aerial robotic systems. System of Systems Cooperative Engagement Test Infrastructure (SCETI) will provide for the development of systems to conduct systems-level Manned-Unmanned Teaming (MUM-T) testing for both aircraft and ground systems in a distributed environment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Electromagnetic Environmental Effects (E3) Systems Modernization (EMRE) project.	5.300	0.769	0.120

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 984 / *Major Developmental Testing Instrumentation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: EMD phase contract activities for the EMRE project. This effort will upgrade 27 instrumentation test facilities at WSMR. ***FY 2018 Plans:*** Continues the EMD phase E3 Systems contract activity. Funds will procure the Electronic and Electromagnetic Interference Test facilities. ***FY 2019 Plans:*** Will complete the EMD phase for E3 Systems contract activity. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease due to completion of EMD activities.			
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Nuclear Effects Test Capability Modernization. ***Description:*** EMD phase contract activity for the Nuclear Effects Test Capability Modernization. ***FY 2018 Plans:*** Continues the EMD phase contract activity for the Nuclear Effects Test Capability Modernization. Funds acquisition and upgrades of Special Test Equipment for Prompt Gamma Simulator facility and Rapid Response Laboratory. ***FY 2019 Plans:*** Will continue the EMD phase contract activity for the Nuclear Effects Test Capability Modernization. Funds acquisition and upgrades of Special Test Equipment for Prompt Gamma Simulator facility and Rapid Response Laboratory. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increased requirement in order to complete additional upgrades for equipment at facilities and laboratories.	9.986	4.835	5.500
Title: Engineering and Manufacturing Development (EMD) phase contract activity of the Test Network Modernization Program. ***Description:*** EMD phase contract activity for the Test Network Modernization. This program will provide a modern test infrastructure capable of reliable, secure transport of test data and test communications for all ATEC developmental test ranges. ***FY 2018 Plans:*** Continues the EMD phase contract activity for the Test Network Modernization. This program will provide a modern test infrastructure capable of reliable, secure transport of test data and test communications for all ATEC developmental test ranges. Funds will procure and install End of Life network hardware for five Test Centers (Aberdeen, Electronic Proving Grounds, Redstone, White Sands, and Yuma), replacing existing obsolete hardware that no longer meets Risk Management Framework	3.032	12.307	12.669

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 984 / *Major Developmental Testing Instrumentation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
(RMF) requirements for operational availability. Includes procurement of a standardized Network Monitoring System across five Test Centers (Aberdeen, Electronic Proving Grounds, Redstone, White Sands, and Yuma) to allow operators the ability to monitor and track network traffic and trouble shoot network failure points. ***FY 2019 Plans:*** Will continue the engineering and manufacturing for the Test Network Modernization. This program will provide a modern test infrastructure capable of reliable, secure transport of test data and test communications for all ATEC developmental test ranges. Funds continue the procurement and install of end of life network hardware for five Test Centers (Aberdeen, Electronic Proving Grounds, Redstone, White Sands, and Yuma), replacing obsolete hardware that no longer meets Authority to Operate (ATO) requirements. Funds will continue standardization of Network Monitoring System across five Test Centers (Aberdeen, Electronic Proving Grounds, Redstone, White Sands, and Yuma) to allow operators the ability to monitor and track network traffic and trouble shoot network failure points. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase due to additional hardware replacement.			
Title: Engineering and Manufacturing Development (EMD) for the Applied Environments Modernization program. ***Description:*** EMD phase contract activity for the Applied Environments Modernization program ***FY 2018 Plans:*** Continues EMD phase contract activity for the Applied Environments Modernization program. This program will upgrade antiquated Environmental labs for climatic and dynamic testing with new cascade refrigeration units, climatic chambers, vibration test systems, x-ray cameras, a real-time radiography system and full spectrum solar lights. ***FY 2019 Plans:*** Will continue the EMD phase for the Applied Environments Modernization program. Funds will continue to provide upgrades to antiquated Environmental labs for climatic and dynamic testing with new cascade refrigeration units, climatic chambers, vibration test systems, x-ray cameras, a real-time radiography system and full spectrum solar lights. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Department of Army Civilian labor costs moved to the Operations & Maintenance, Army appropriation.	2.061	4.621	3.968
Title: Engineering and Manufacturing Development (EMD) phase contract activity for System of Systems Controlled Environment Test Infrastructure (SCETI) ***Description:*** EMD phase for System of Systems Cooperative Engagement Test Infrastructure (SCETI). ***FY 2018 Plans:***	0.973	1.438	3.000

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 984 / *Major Developmental Testing Instrumentation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Continues EMD phase contract activity for the SCETI program. This program will design and develop a test chamber to replicate degraded visual environments for various environmental conditions (i.e. rain, dust, snow, etc.) for helicopters. ***FY 2019 Plans:*** Will continue EMD phase contract activity for the SCETI program. This program will deliver the modular airborne sensor capability to test avionic sensors in degraded visual environments such as rain, dust, and snow for helicopters. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Increase due to development of sensors to test avionics.			
Title: Engineering and Manufacturing Development (EMD) phase contract activity for Robotics/UAS Instrumentation Suite ***Description:*** EMD phase of Robotics/Unmanned Autonomous System (UAS) Instrumentation Suite for testing controlled and autonomous ground and aerial robotic systems. ***FY 2018 Plans:*** Continues EMD phase contract activity for the Robotics/UAS Instrumentation Suite. This program will procure instrumentation to be installed on aerial and ground platforms to collect performance test data. Initial instrumentation acquisition will focus on Global Position System (GPS) tracking and accuracy. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease due to EMD activity completion for phase one. Program will continue in the out years.	3.030	3.247	-
Title: Engineering and Manufacturing Development (EMD) phase contract activity of the Common Range Integrated Instrumentation System (CRIIS) Objective Program. ***Description:*** EMD phase contract activities of the CRIIS Objective Program. This is a replacement system for the Advanced Range Data System (ARDS). This system will meet the critical need for measuring the precision location of units under test within the Time-Space domain. It provides a significant increase to the Test & Evaluation ranges' capability to meet the test instrumentation needs of the tri-service range users. The improvements are the data link, TSPI accuracy, miniaturization, standard interfaces, and system encryption of high dynamic instrumentation tracking pods. CRIIS instrumentation upgrades will be delivered to WSMR. ***FY 2018 Plans:*** Complete EMD of the CRIIS Objective Program. Funds acquisition of CRIIS Lot 3 support equipment comprised of five Instrumentation Pods, and associated remote ground stations and support equipment. ***FY 2018 to FY 2019 Increase/Decrease Statement:***	3.785	2.475	-

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 984 / *Major Developmental Testing Instrumentation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Effort complete in FY18.			
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Future Wireless Network program. ***Description:*** EMD phase contract activity for the Future Wireless Network program.	1.024	-	-
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Telemetry Systems Modernization program ***Description:*** EMD phase contract activity for the Telemetry Systems Modernization program.	1.450	-	-
Accomplishments/Planned Programs Subtotals	30.641	29.692	25.257

	FY 2017	FY 2018
Congressional Add: Congressional Add for Cyber Vulnerabilities Research ***FY 2017 Accomplishments:*** N/A	12.000	-
Congressional Adds Subtotals	12.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 6	R-1 Program Element (Number/Name) PE 0604759A / *Major T&E Investment*	Project (Number/Name) 986 / *Major Operational Test Instrumentation*	

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
986: *Major Operational Test Instrumentation*	-	17.311	18.990	12.845	-	12.845	14.628	14.832	15.288	15.508	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds the development, acquisition, and integration of major operational test instrumentation for the U.S. Army Test and Evaluation Command's Operational Test Command and supporting test activities at test and training ranges. Requirements for instrumentation are identified through a long range survey of project managers, Research Development and Engineering Centers (RDECs), and Battle Laboratories developing future weapon systems and the test programs that support these systems. Project focus is to address Director Operational Test and Evaluation (DOT&E)-identified Army test realism shortfalls.

FY19 funds will be used for Follow-On Operational Test and Evaluation (FOT&E) in support of PM Apache, Joint Light Tactical Vehicle (JLTV) and Rifleman Radio.

Projects are designated as a major test program based on their visibility, assessed relative technical risk (medium-high), schedule risk, cost (greater than $1.5 Million per year or $7.5 Million for the total project) and applicability to other mission areas or services. These projects are technically demanding, state-of-the-art, unique instrumentation assets or suites to meet the technology shortfalls, and generally result from development programs managed by a professional project management team.

The DOT&E annual report to Congress identified shortfalls in the Army's abilities to create realistic operational environments. The Integrated Live-Virtual-Constructive (LVC) Test Environment (ILTE) project will address multiple shortfalls identified by DOT&E. ILTE is a portfolio of related development efforts that will deliver a system of systems to provide a Real-Time Casualty Assessment (RTCA) and instrumentation suite that delivers a high fidelity, realistic, real-time capability to measure hardware and personnel performance in modern combat environments. ILTE will enable testing under tactical conditions for small and large-scale operations while integrating network operations and effects in support of the Army Equipment Modernization Plan. ILTE also allows the U.S. Army to test all Current-to-Future weapon systems in a realistic operational environment. ILTE will transition Research, Development, Test and Evaluation (RDTE) developed performance enhancements and technology upgrades to the operational test command, control, and communications, communications network, weapons system interfaces, vehicle and dismounted-troop kits and peripherals, Global Positioning System (GPS), encryption components, and integrate operational realistic digital battlefield data collection and analysis tools. These tools will collect, store and analyze data from the digital battlefield. Improvements will enable the ILTE system of systems to measure and record accrued damage, levels of exposure, effects of countermeasures, evasive action, and instrument threat vehicles. This capability is required by the operational test community to integrate digital battlefield data collection and analysis tools into the Network Integration Evaluations (NIEs), M1A2 Abrams, M2A4 Bradley, Stryker, Armored Multi-Purpose Vehicle (AMPV), Apache AH-64E, Gray Eagle and other operational tests.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Integrated Live-Virtual-Constructive (LVC) Test Environment (ILTE) - formerly "Real-Time Casualty Assessment (RTCA)"	17.311	18.990	12.845

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 986 / *Major Operational Test Instrumentation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: Transition from Technology Maturation and Risk Reduction (TMRR) Phase to Engineering, Manufacturing, and Development Phase and acquisition of ILTE capabilities required to conduct Operational Tests. ***FY 2018 Plans:*** Transition ILTE activity from TMRR to EMD Phase. Project ramps up to provide capabilities in direct support of Operational Test of the AH-64E, JLTV, and AMPV. Will continue to fund the development of hardware, software, interfaces, and new capabilities to ensure Real-Time Casualty Assessment(RTCA)/ILTE requirements for upcoming operational tests are satisfied. Will fund integration of improved representation of unmanned aerial system in operational test environments. Will continue to develop capability to provide a realistic operational test environment. Funds will continue to be allocated for Real-Time Casualty Assessment (RTCA) instrumentation and simulation systems to be used to support Force-on-Force Operational Tests which support a more comprehensive operational test infrastructure. New development efforts will include integration of classified and unclassified simulations into a common environment. Continued development efforts include, integration with new tactical systems under test, integration with Live, Virtual, and Constructive simulation environments, RTCA capabilities for active protection systems and countermeasures, RTCA capabilities for communications/sensor kills and degradations, development, integration, and testing of mission command effects and degradations, communications upgrade, new communications sub-systems, new encryption and RTCA capabilities for electronic warfare and countermeasures. ***FY 2019 Plans:*** ILTE continues EMD phase. Project will provide capabilities in direct support of Operational Test of the AH-64E, JLTV, and AMPV. Will continue to fund the development of hardware, software, interfaces, and new capabilities to ensure RTCA / ILTE requirements for upcoming operational tests are satisfied. Will fund integration of improved representation of unmanned aerial system in operational test environments. Will continue to develop capability to provide a realistic operational test environment. Funds will continue to be allocated for RTCA instrumentation and simulation systems to be used to support Force-on-Force Operational Tests which support a more comprehensive operational test infrastructure. New development efforts will include integration of classified and unclassified simulations into a common environment. Continued development efforts include: integration with new tactical systems under test, integration with LVC simulation environments, RTCA capabilities for active protection systems and countermeasures, RTCA capabilities for communications/sensor kills and degradations, development, integration, and testing of mission command effects and degradations, communications upgrade, new communications sub- systems, new encryption and RTCA capabilities for electronic warfare and countermeasures. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Decrease due to Department of Army Civilian labor costs moving to the Operations & Maintenance, Army appropriation.			
Accomplishments/Planned Programs Subtotals	17.311	18.990	12.845

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** 986 / *Major Operational Test Instrumentation*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 6	R-1 Program Element (Number/Name) PE 0604759A / *Major T&E Investment*	Project (Number/Name) EY9 / *Range Radar Replacement Program (RRRP)*	

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
EY9: *Range Radar Replacement Program (RRRP)*	-	25.320	42.006	23.148	-	23.148	47.419	18.366	18.901	13.832	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Range Radar Replacement Program (RRRP) develops modern instrumentation radars to replace obsolete tracking and surveillance radars at U.S. Army Test and Evaluation Command's Developmental Test Command (DTC) activities which include: Aberdeen Test Center (ATC), MD; Redstone Test Center (RTC), AL; White Sands Test Center (WSTC), NM; and Yuma Test Center (YTC), AZ. The acquisition of modern instrumentation radar systems will provide the Army critical testing data essential for the development of complex next generation technology and advanced system capabilities. The RRRP provides the test centers with improved radar resolution, sensitivity, accuracy, clutter suppression, and reliability. The planned solution to meet program requirements consists of four primary items: Long Range Single Object Tracking Radars (SOTR), Long Range Multiple Object Tracking Radars (MOTR), Medium Range Radars (MRR), and Short Range Radars (SRR). The resulting system will not only reduce operation and sustainment costs for the ranges, but improve data collection, thus enhancing development of Army systems being tested at these ranges. The current fleet of instrumentation radars located at ATC, RTC, WSTC, and YTC has become antiquated to the extent that they are not able to support the test needs of the test centers.

The Project will procure Commercial-Off-The-Shelf (COTS) and/or Modified Commercial-Off-The-Shelf (MOTS) radars for both the MRR and SRR solutions, and a combination of recapitalization and COTS/MOTS replacement for the FPS-16 Long Range Radars. Also, the program will conduct EMD for upgrading three MPS-39 Long Range MOTRs.

Fiscal Year 2019 funds the procurement and testing of COTS Medium Range Radars as replacement equipment to ATC, RTC,WSTC and YTC.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Engineering and Manufacturing Development (EMD) Phase Contract Activity	25.320	42.006	23.148
Description: EMD phase contracts activities for RRRP.			
FY 2018 Plans: Conduct EMD for the RRRP LRR (MPS-39 Radar Upgrade). Results of the Business Case Analysis (BCA) completed in FY17 have refocused/realigned the program to procure COTS radars for the remaining SRR and MRR systems; COTS for replacement of the remaining FPS-16 Radar system; Recapitalize/Upgrade three MPS-39 Radar systems as replacements of equipment at ATC, RTC, WSTC, and YTC.			
FY 2019 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** EY9 / *Range Radar Replacement Program (RRRP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Delivery of recapitalized FPS-16 LRRs and COTs MRRs to YTC and WSTC. Support and conduct factory acceptance and site acceptance testing with vendors and ATEC ranges. Continue EMD for the MPS-39 Long Range MOTRs. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2019 funding was reduced due to availability of prior year balances. This will eliminate procurement of one COTS LRR and two MRRs previously planned in FY 2019.			
Accomplishments/Planned Programs Subtotals	25.320	42.006	23.148

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 6	R-1 Program Element (Number/Name) PE 0604759A / *Major T&E Investment*	Project (Number/Name) FA4 / *Warrior Injury Assessment Manikin (WIAMan)*	

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
FA4: *Warrior Injury Assessment Manikin (WIAMan)*	-	1.634	5.000	14.434	-	14.434	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Warrior Injury Assessment Manikin (WIAMan) Anthropomorphic Test Device (ATD) Project will develop and produce Warrior-representative ATDs that incorporate realistic, biomechanically-validated injury features and assessment tools to better characterize dynamic events and injury risks measured in Live Fire Test & Evaluation (LFT&E) and vehicle development efforts. This capability is comprised of an ATD system built for the Title 10 LFT&E environment and associated biomechanics data and analysis tools. The current manikins do not represent the modern Warrior and were not designed for the vertical acceleration environment associated with underbody blast (UBB) events. Consequently, current LFT&E crew survivability assessment devices are limited in their ability to predict the types and severity of injuries seen in these events. Due to this technology gap, military ground vehicles are being fielded without fully defined levels of injury risk and crew survivability for Under Body Blast (UBB) events. The device produced by this Project will be used to satisfy a critical need for scientifically valid capability for analyzing the risk of injury caused by UBB.

Other Program Funding Summary: Biomechanical research supporting WIAMan is funded by the Defense Health Agency (DHA), R-1 Program Element PE 0603115DHA/Medical Technology Development Project 431A / Underbody Blast Testing (Army) (FY2018, $8M).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Warrior Injury Assessment Manikin (WIAMan) Anthropomorphic Test Device (ATD)	1.634	5.000	14.434
Description: The Warrior Injury Assessment Manikin (WIAMan) Anthropomorphic Test Device (ATD) project will provide the Army Test and Evaluation Command and Army Research Laboratory with a Warrior-representative blast test manikin and data acquisition system to assess the risk of injury during underbody blast testing of military ground vehicles. Acquisition Strategy: Technology transfer from Research and Development Command (RDECOM). Contract for the Anthropomorphic Test Devices (ATDs) with industry leveraging the technology data package provided by RDECOM. ***FY 2018 Plans:*** Continues the transition from Research and Development Command (RDECOM) science and technology research to WIAMan ATD prototype refinement to source selection activities and entry into the Engineering and Manufacturing Development (EMD) phase. FY18 funding covers additional costs associated with testing, engineering and procurement of fieldable prototypes. ***FY 2019 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** FA4 / *Warrior Injury Assessment Manikin (WIAMan)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
FY19 funding continues to cover costs associated with testing, engineering, procurement, and delivery of the first ten (10) ATDs, calibration and certification equipment, and verification and validation testing. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY2019 funding covers costs associated with testing, engineering and delivery of the first ten (10) ATDs, procuring certification and calibration equipment, and planning and executing verification and validation testing.			
Accomplishments/Planned Programs Subtotals	1.634	5.000	14.434

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A