Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019	
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*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	-	113.516	82.893	136.565	-	136.565	77.953	49.550	67.188	41.242	Continuing	Continuing
983: *Reagan Test Site (RTS) T&E Investments*	-	6.924	7.303	6.247	-	6.247	6.286	6.573	6.694	8.150	Continuing	Continuing
984: *Major Developmental Testing Instrumentation*	-	43.601	25.226	34.342	-	34.342	32.072	28.898	36.831	31.977	Continuing	Continuing
986: *Major Operational Test Instrumentation*	-	15.263	12.829	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
EY9: *Range Radar Replacement Program (RRRP)*	-	42.928	23.119	94.760	-	94.760	38.540	12.980	21.400	0.000	Continuing	Continuing
FA4: *Warrior Injury Assessment Manikin (WIAMan)*	-	4.800	14.416	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
FF1: *Cyber Blue Team*	-	0.000	0.000	1.216	-	1.216	1.055	1.099	2.263	1.115	0.000	6.748

Note

Project FF1 was previously funded in 0604256A (Threat Simulator Development) Project 976 (Army Threat Sim (ATS)).

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), New Mexico; Yuma Test Center (YTC), Arizona; Aberdeen Test Center (ATC), Maryland; Electronic Proving Ground (EPG), Arizona; Redstone Test Center (RTC), Alabama; 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, until Fiscal Year (FY) 2020, management of the Cyber Acquisition Blue Teams (CABT) 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 2020 Army	Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	102.901	82.996	104.789	-	104.789
Current President's Budget	113.516	82.893	136.565	-	136.565
Total Adjustments	10.615	-0.103	31.776	-	31.776
• Congressional General Reductions	-0.081	-0.103			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	12.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.600	-			
• SBIR/STTR Transfer	-3.904	-			
• Adjustments to Budget Years	-	-	31.776	-	31.776

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2018	FY 2019
Project: 984: *Major Developmental Testing Instrumentation*		
Congressional Add: *Congressional Add for Cyber Virtualization Research*	12.000	-
Congressional Add Subtotals for Project: 984	12.000	-
Congressional Add Totals for all Projects	12.000	-

Change Summary Explanation

FY18 congressional add ($12.000 million) for cyber virtualization research.

FY20 Base funding increase ($31.776 million) to procure seven additional Range Radar Replacement Program (RRRP) systems in Project EY9.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
983: *Reagan Test Site (RTS) T&E Investments*	-	6.924	7.303	6.247	-	6.247	6.286	6.573	6.694	8.150	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) instrumentation systems. The Reagan Test Site with its remote location and one of kind instrumentation systems provides a strategic test environment that cannot be replicated. In order to continue its critical mission of testing missile systems that are of paramount importance to the defense of the nation, the RTS instrumentation systems must be continuously updated and upgraded to support the emerging technologies being developed by the DoD such as hypersonics and other advanced weapons systems. Without modernization these instrumentation systems face obsolescence or degraded capability and the inability to provide the critical data needed for continued materiel development. Without instrumentation on par with the technologies being utilized in emerging systems, the materiel developer will be unable to complete their test programs or pass programmatic milestones toward deployment. These funds provide 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. The RTS instrumentation is required to support data collection for test & evaluation assessments and operational decisions that have strategic implications 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 2018	FY 2019	FY 2020
Title: Radar Open Systems Architecture (ROSA) Refresh ***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.	0.900	-	-
Title: Radar Reliability Improvement Program (RRI). ***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 Refresh; Obsolescence; Commonality of Design across Sensors; Enhanced Monitoring; Fault Detection - Fault Isolation (FD/FI); Enable Remote Operation and Monitoring; and Enhanced Capabilities.	0.141	0.500	0.085

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
FY 2019 Plans: RRI Program continues 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. For FY19 the TRADEX S-band Bandwidth Enhancements study effort which will address identifying a more capable Klystron with higher power and bandwidth to address a critical SOTR risk, and also to support Hypersonic test requirements will begin. Additional efforts include a technical study to evaluate an updated architecture and technology insertion strategy to replace obsolete subsystems. ***FY 2020 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 2019 to FY 2020 Increase/Decrease Statement:*** Decrease aligns enduring requirements with holistic program assessment of RTS instrumentation needs.			
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 back-end 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 2019 Plans:*** Complete purchase of Roi Island modernized TM equipment. Reach Initial Operating Capability for a single telemetry site. ***FY 2020 Plans:*** Continuation of Verification and Acceptance (V&A) testing effort focusing on engineering test for the full-up capability and deployment of the modernized telemetry equipment to the other TM sites within RTS range (Kwaj, Illegini, & Gagan Islands). ***FY 2019 to FY 2020 Increase/Decrease Statement:***	2.500	2.480	1.732

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
Telemetry (TM) Modernization Study decrease aligns enduring requirements with holistic program assessment of RTS instrumentation needs.			
Title: Legacy Servo Upgrade Program. ***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 2020 Plans:*** Continue assessment of remaining antenna servo systems and determine next highest priority servo replacement need and initiate engineering design activities for the next phase of the program. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Legacy Servo Upgrade Program increase due to inflation.	-	1.183	1.500
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 2019 Plans:*** Continue development of multi-statics for KREMS Radars. Conduct initial proof of concept tests. ***FY 2020 Plans:*** Continue the phase two effort designing and implementing a small prototype receive array on site at RTS as a proof of concept for a future target system consisting of larger array and transmitter modernizations. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Multi-Statics for Radars and Telemetry - Prototype increase due to inflation changes	0.283	0.781	0.800
Title: Ground Based Discrimination Radar	3.100	1.600	0.780

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
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 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 2020 Plans:*** Continue GBR upgrade external systems and infrastructure work. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Ground Based Discrimination Radar decrease aligns enduring requirements with holistic program assessment of RTS instrumentation needs.			
Title: RTS Cyber Threat Assessment and Mitigation ***Description:*** 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 2020 Plans:*** Continue system development phase with yard antenna placement and integration. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in expected requirement for RTS Cyber Threat Assessment and Mitigation based on holistic program assessment of RTS instrumentation needs.	-	0.491	0.800
Title: RTS Range Enhancements for Hypersonic Vehicle Testing ***Description:*** The Range Enhancements for Hypersonic Vehicle Testing program will develop and deploy advanced technologies and a number of infrastructure upgrades specific to hypersonic vehicle testing. These technologies and infrastructure improvements include advanced non-ballistic tracking enhancements, improved data collection, additional waveform support, sensor surrogate capabilities and integration of adjunct sensors to support situational awareness and future tracking enhancements.	-	-	0.550

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
FY 2020 Plans: In FY20, the program will begin maturing and deploying enhanced tracking algorithms to the RTS sensor suite. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Hypersonic Vehicle Testing is an emerging effort for FY20 that will focus on improving/enhancing tracking algorithms within the RTS sensor suite.			
Title: FY19 SBIR/STTR Transfer ***Description:*** Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) ***FY 2019 Plans:*** Accounting for full funding amount. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Accounting for full funding amount.	-	0.268	-
Accomplishments/Planned Programs Subtotals	6.924	7.303	6.247

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 2020 Army			Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
984: *Major Developmental Testing Instrumentation*	-	43.601	25.226	34.342	-	34.342	32.072	28.898	36.831	31.977	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. FY20 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 2018	FY 2019	FY 2020
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Electromagnetic Environmental Effects (E3) Systems Modernization (EMRE) project.	0.741	0.114	6.600

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
Description: EMD phase contract activities for the EMRE project. This effort will upgrade 27 instrumentation test facilities at WSMR. ***FY 2019 Plans:*** complete the EMD phase for E3 Systems contract activity. ***FY 2020 Plans:*** Will complete acquisition of key components and finish project in FY20. Additional key components include Electromagnetic Interface equipment and Pulsed Ultra Magnetron Discharge equipment needed for electromagnetic instrumentation testing at WSMR. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 testing requirements drove the need for additional Electromagnetic Interference equipment.			
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 2019 Plans:*** 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. ***FY 2020 Plans:*** Will complete the EMD phase and field the Nuclear Effects Test Capabilities Modernization Prompt Gamma Simulator. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increased requirement in order to complete additional upgrades for equipment at facilities.	7.657	5.246	8.775
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 2019 Plans:*** 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)	11.841	12.085	12.881

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
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 2020 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 troubleshoot network failure points. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 funding increase for design testing.			
Title: Engineering and Manufacturing Development (EMD) for the Applied Environments Modernization program. ***Description:*** EMD phase contract activity for the Applied Environments Modernization program ***FY 2019 Plans:*** 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 2020 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 2019 to FY 2020 Increase/Decrease Statement:*** Funds realigned to higher Army test priorities based on detailed, holistic assessment of developmental testing needs.	4.565	3.785	1.036
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 2019 Plans:***	3.292	2.862	3.312

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
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 2020 Plans:*** Will continue EMD phase contract activity for the SCETI program. In FY20, this program will complete Emulation Flight Capability installation and acceptance testing; and the design and acceptance testing of Atmospheric Measurement equipment. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY20 funding increase for design testing.			
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 2020 Plans:*** Continue market research and acquisition strategy refinement. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Project continuing in FY20 after skip year..	1.121	-	1.738
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.	2.384	-	-
Title: FY19 SBIR/STTR Transfer ***FY 2019 Plans:*** Accounting for full funding amount. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Accounting for full funding amount.	-	1.134	-
Accomplishments/Planned Programs Subtotals	31.601	25.226	34.342

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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*

	FY 2018	FY 2019
Congressional Add: Congressional Add for Cyber Virtualization Research	12.000	-
FY 2018 Accomplishments: Congressional Add for Cyber Virtualization Research		
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 2020 Army			Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
986: *Major Operational Test Instrumentation*	-	15.263	12.829	0.000	-	0.000	0.000	0.000	0.000	0.000	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.

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.

Fiscal Year (FY) 2019 funds remaining for obligation in FY20 will be used to complete Block 1 of the Follow-On Operational Test and Evaluation (FOT&E) in support of PM Apache, Joint Light Tactical Vehicle (JLTV) and Rifleman Radio. In FY20 operational test instrumentation funding is strategically realigned to Army modernization in support of the National Defense Strategy.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
Title: Integrated Live-Virtual-Constructive (LVC) Test Environment (ILTE) - formerly "Real-Time Casualty Assessment (RTCA)" ***Description:*** Complete Block 1 of the Engineering, Manufacturing, and Development (EMD) Phase and acquisition of ILTE capabilities required to conduct Operational Tests. ***FY 2019 Plans:*** ILTE completing Block I. 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 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 to FY 2020 Increase/Decrease Statement:*** Funding levels are designed to align program requirements with Army Modernization Priorities in support of the National Defense Strategy.	15.263	12.149	-
Title: FY SBIR/STTR Transfer ***Description:*** Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) ***FY 2019 Plans:*** Accounting for full funding amount. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Accounting for full funding amount.	-	0.680	-
Accomplishments/Planned Programs Subtotals	15.263	12.829	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EY9: *Range Radar Replacement Program (RRRP)*	-	42.928	23.119	94.760	-	94.760	38.540	12.980	21.400	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In order to effect strategic overmatch on current and future battlefields, it is essential that the United States (U.S.) Army provide advanced radar system instrumentation for developmental testing. Since existing range radar instrumentation is aged beyond useful life and cannot adequately support emerging test requirements in areas such as hypersonics, 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 with critical testing data essential for the development of 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 systems 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.

This 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 (LRR). Also, the program will conduct Engineering and Manufacturing Development (EMD) for upgrading three MPS-39 Long Range MOTRs.

The Fiscal Year (FY) 2020 request of $94.760 million continues procurement of MRRs and LRRs and provides acceptance testing of Medium, Long, and MPS-39 MOTR radars. The significant increase in requested program funding from FY 2019 to FY 2020 procures seven additional radars, accelerating the program by one year. This strategic acceleration aligns RRRP with developmental testing requirements emerging from Army Modernization efforts in support of the National Defense Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Engineering and Manufacturing Development (EMD) Phase Contract Activity	42.928	22.272	94.760
Description: EMD phase contract activities for RRRP are designed to provide advanced radar instrumentation suites that meet emerging requirements for developmental testing.			
FY 2019 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
Procure COTS SRRs and deliver recapitalized FPS-16 LRRs and COTS MRRs to YTC and WSTC. Will support and conduct factory acceptance and site acceptance testing with vendors and ATEC ranges. Will continue EMD for the MPS-39 Long Range MOTRs. ***FY 2020 Plans:*** Will continue procurement of MRRs and LRRs. Will continue EMD and initial acceptance testing of MPR-39 MOTR and LRRs. Will continue delivery and acceptance testing of MRRs with vendors and ATEC ranges. This effort's funding will be executed by the RRRP program. FY20 funding procures seven additional radars and accelerates the program by one year. This acceleration is designed to align program requirements with Army Modernization Priorities in support of the National Defense Strategy. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in funding from FY 2019 to FY 2020 procures seven additional radars and accelerates the program by one year. This acceleration is designed to align program requirements with Army Modernization Priorities in support of the National Defense Strategy.			
Title: FY19 SBIR/STTR Transfer ***Description:*** Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) ***FY 2019 Plans:*** Accounting for full funding amount. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Accounting for full funding amount.	-	0.847	-
Accomplishments/Planned Programs Subtotals	42.928	23.119	94.760

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 2020 Army			Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FA4: *Warrior Injury Assessment Manikin (WIAMan)*	-	4.800	14.416	0.000	-	0.000	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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Warrior Injury Assessment Manikin (WIAMan) Anthropomorphic Test Device (ATD) ***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. ***FY 2019 Plans:*** 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 2019 to FY 2020 Increase/Decrease Statement:*** WIAMan has funding in FY19 to deliver ten devices. Funding in FY20 aligns program requirements with Army modernization priorities in support of the National Defense Strategy.	4.800	13.665	-
Title: FY19 SBIR/STTR Transfer ***Description:*** Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) ***FY 2019 Plans:***	-	0.751	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
Accounting for full funding amount. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Accounting for full funding amount.			
Accomplishments/Planned Programs Subtotals	4.800	14.416	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Biomechanical research supporting WIAMan is funded by the Defense Health Agency (DHA), Program Element PE 0603115DHA/Medical Technology Development Project 431A / Underbody Blast Testing (Army).

D. 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.

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 6	R-1 Program Element (Number/Name) PE 0604759A / *Major T&E Investment*	Project (Number/Name) FF1 / *Cyber Blue Team*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FF1: *Cyber Blue Team*	-	0.000	0.000	1.216	-	1.216	1.055	1.099	2.263	1.115	0.000	6.748
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This effort was previously funded in PE 0604256A (Threat Simulator Development) / Project 976 (Army Threat Sim (ATS)).

A. Mission Description and Budget Item Justification

In 2016 the Army Acquisition Executive (AAE) designated the Program Manager for Instrumentation, Target and Threat Simulators (PM ITTS) as the Office of Primary Responsibility for Acquisition Blue Teams, to provide management and execution of relevant Cyber Blue Team assessment capabilities in support of the acquisition and test communities. Cyber Blue Teams refer to the cyber team which works cooperatively with the system owner to ensure programs can defend against attackers and/or Red Teams. These Cyber Blue Team capabilities are essential to enable military operators to assess and defeat the presence of cyber security threats across Army networks. PM ITTS will also serve as the primary point of contact for cyber-related testing and vulnerabilities assessments with U.S. Cyber Command and Army Cyber. This Project executes the establishment and management of certification standards for Acquisition Blue Teams and coordination of Blue Team requirements on behalf of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA ALT).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2018	FY 2019	FY 2020
Title: Cyber Blue Teams	-	-	1.216
Description: Management and oversight of Cyber Blue Team vulnerability assessments. ***FY 2020 Plans:*** FY20 funding will develop a central repository for vulnerability assessments. Will continue to manage certification standards for Cyber Blue Teams in coordination with all Project Managers on behalf of Assistant Secretary of the Army for Acquisition, Logistics, and Technology. The Cyber Blue Teams standards office will be the single point of contact with United States Cyber Command (CYBERCOM) for open and closed networks. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Prior year FY 2019 funds were programmed in PE 0604256A at $0.925 million. FY 2020 increase for development of central repository.			
Accomplishments/Planned Programs Subtotals	-	-	1.216

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** FF1 / *Cyber Blue Team*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A