Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020	
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 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	-	79.214	146.565	106.270	-	106.270	59.144	73.193	67.302	74.317	Continuing	Continuing
983: *Reagan Test Site (RTS) T&E Investments*	-	7.035	6.247	6.280	-	6.280	6.567	6.688	8.143	8.143	Continuing	Continuing
984: *Major Developmental Testing Instrumentation*	-	21.092	44.342	44.614	-	44.614	38.511	42.864	32.500	31.950	Continuing	Continuing
986: *Major Operational Test Instrumentation*	-	15.150	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
EY9: *Range Radar Replacement Program (RRRP)*	-	22.272	94.760	54.322	-	54.322	12.968	21.380	25.545	33.110	Continuing	Continuing
FA4: *Warrior Injury Assessment Manikin (WIAMan)*	-	13.665	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
FF1: *Cyber Blue Team*	-	0.000	1.216	1.054	-	1.054	1.098	2.261	1.114	1.114	0.000	7.857

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 United States 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 beginning in Fiscal Year 2020 (FY20), 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 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	82.893	136.565	77.953	-	77.953
Current President's Budget	79.214	146.565	106.270	-	106.270
Total Adjustments	-3.679	10.000	28.317	-	28.317
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.679	-			
• Adjustments to Budget Years	-	-	28.317	-	28.317

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Project: 984: *Major Developmental Testing Instrumentation*		
Congressional Add: *High Powered Microwave Test and Evaluation Assets*	-	10.000
Congressional Add Subtotals for Project: 984	-	10.000
Congressional Add Totals for all Projects	-	10.000

Change Summary Explanation

This Congressional Add funding will be used to develop a surrogate HPM payload suitable for airborne test and evaluation applications.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
983: *Reagan Test Site (RTS) T&E Investments*	-	7.035	6.247	6.280	-	6.280	6.567	6.688	8.143	8.143	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 Department of Defense (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 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 2019	FY 2020	FY 2021
Title: Radar Reliability Improvement Program (RRI).	0.500	0.741	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 Refresh; Obsolescence; Commonality of Design across Sensors; Enhanced Monitoring; Fault Detection - Fault Isolation (FD/FI); Enable Remote Operation and Monitoring; and Enhanced Capabilities.			
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 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
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 2020 to FY 2021 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
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 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 2021 Plans:*** Continuation of 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).	2.477	2.500	2.500
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 2021 Plans:*** 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 2020 to FY 2021 Increase/Decrease Statement:***	1.183	-	0.700

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
Decreased due to RTS reprioritization based on criticality of projects.			
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.	0.781	-	-
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.	1.600	-	-
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 2021 Plans:*** system development phase with yard antenna placement and integration. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease due to RTS reprioritization based on criticality of projects.	0.491	-	0.500
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. ***FY 2021 Plans:*** begin maturing and deploying enhanced tracking algorithms to the RTS sensor suite ***FY 2020 to FY 2021 Increase/Decrease Statement:***	-	-	0.309

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
Decrease due to RTS reprioritization based on criticality of projects.			
Title: Digital Focal Plane Array (DFPA) Technology Insertion ***Description:*** DFPA Technology Insertion program designs, builds, and integrates DFPA-based camera systems and other leading-edge imaging technologies into existing Super Recording Automatic Digital Optical Tracker (RADOT) mounts at RTS. The cameras and telescopes will provide coverage in multiple imaging bands including Middle Wave Infra-Red (MWIR) and Long Wave Infra-Red (LWIR). ***FY 2021 Plans:*** Procure and deploy additional DFPA based cameras at SR Optics site ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase due to RTS reprioritization based on criticality of projects.	-	-	0.700
Title: Radar Open System Architecture (ROSA) Refresh ***Description:*** ROSA initial concept and implementation subdivided each of the RTS radars into logical and separable functional building blocks. Up to nine common subsystems including receivers, transmitters and antenna controls were designed using Commercial Off the Shelf (COTS) equipment to provide a unified framework, largely eliminating the very unique and custom hardware and software at each of the RTS radars. Over a decade of technology advancement and further maturity of industry standards have outdated the current ROSA implementation, posing a sustainability problem. This program will identify key subsystem technologies and architectures to stabilize future procurement, maintenance and operational capability across all RTS radars. ***FY 2020 Plans:*** replaces COTS that are obsolete, limited in availability or at the end of the life cycle of the equipment with commercially available open architecture components. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Requested External funding (CTEIP) for FY21	-	2.000	-
Title: TRADEX L-Band High Voltage Power Supply Upgrade ***Description:*** TRADEX L-Band High Voltage Power Supply Upgrade will improve resilience of L-band by providing a backup power supply and a test stand where tubes can be tested without impacting the operational system. ***FY 2020 Plans:***	-	0.750	0.820

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Begin to upgrade the unregulated supply components that are obsolete and a single point of failure for the TRADEX radar with a modern solid state power supply technology ***FY 2021 Plans:*** Continue to upgrade the unregulated supply components that are obsolete and a single point of failure for the TRADEX radar with a modern solid state power supply technology which would replace the legacy power supply, modulator, crowbar and capacitor bank. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase due to the criticality of the requirement.			
Title: FFRDC Tax ***Description:*** Federally Funded Research and Development Center (FFRDC) ***FY 2020 Plans:*** Federally Funded Research and Development Center (FFRDC) ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FFRDC Tax	-	0.006	-
Title: SBIR/STTR Transfer ***Description:*** Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) ***FY 2020 Plans:*** Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) ***FY 2021 Plans:*** Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)	-	0.250	0.251
Title: FY2018 NDAA SEC 825 MDAP Cost Overrun ***Description:*** FY2018 NDAA SEC 825 MDAP Cost Overrun	0.003	-	-
Accomplishments/Planned Programs Subtotals	7.035	6.247	6.280

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
984: *Major Developmental Testing Instrumentation*	-	21.092	44.342	44.614	-	44.614	38.511	42.864	32.500	31.950	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 United States 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 1.500 Million per year or 7.500 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. Fiscal Year 2021 (FY21) funds will be used for modernization of outdated instrumentation in support of developmental testing for Army, Department of Defense programs.

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. Robotics/Unmanned Aerial Systems (R/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. ATEC Fiber Modernization will provide all ATEC Test Centers with a revitalized fiber network to complement the TNM program. Telemetry Systems Modernization (TSM) will modernize outdated telemetry systems with new equipment designed to enhance the technical and spectral capabilities currently available. This new telemetry equipment will also provide for a remote controlled operational environment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Electromagnetic Environmental Effects (E3) Systems Modernization (EMRE) project.	0.114	6.340	-
Description: EMD phase contract activities for the EMRE project. This effort will upgrade 27 instrumentation test facilities at WSMR. This effort supports Long Range Precision Fires, Next Generation Combat Vehicle and Future Vertical Lift Cross-Functional Teams.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
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 2020 to FY 2021 Increase/Decrease Statement:*** Project completion expected in FY2020.			
Title: EMD phase contract activity for the Nuclear Effects Test Capability Modernization. ***Description:*** EMD phase contract activity for the Nuclear Effects Test Capability Modernization. This effort supports Long Range Precision Fires, Next Generation Combat Vehicle and Future Vertical Lift Cross-Functional Teams. ***FY 2020 Plans:*** Will complete the EMD phase and field the Nuclear Effects Test Capabilities Modernization Prompt Gamma Simulator. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project completion expected in FY2020.	5.246	8.515	-
Title: EMD phase contract activity of the Test Network Modernization. ***Description:*** EMD phase contract activity for the Test Network Modernization. This effort will provide a modern test infrastructure capable of reliable, secure transport of test data and test communications for all ATEC test ranges. This effort supports Long Range Precision Fires, Next Generation Combat Vehicle and Future Vertical Lift Cross-Functional Teams. ***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 2021 Plans:*** The Test Network Modernization effort will continue in the engineering and manufacturing phase. The site surveys from FY19 will have been evaluated and the remainder of the equipment required for the Test Centers will be purchased based on considerations of their requirements and their upcoming tests. In addition, the evaluation of the site surveys will be complete and the direction	9.085	12.621	13.020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
for hardware and software needs will be accomplished so as to provide the direction to create an enterprise network for the test centers. FY21 funds in the amount of 13.020 Million will continue the standardization of the network that will allow modern monitoring, tracking, and troubleshooting of network issues and failure points. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY2021 budget increase due to additional equipment upgrade needs identified in FY2019 test center site surveys.			
Title: EMD for the Applied Environments Modernization. ***Description:*** EMD phase contract activity for the Applied Environments Modernization program. This effort supports Long Range Precision Fires, Next Generation Combat Vehicle, Future Vertical Lift, Air and Missile Defense Cross-Functional Teams. ***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 2021 Plans:*** Will continue EMD phase for Applied Environments Modernization program. In FY2021 funds in the amount of 10.656 Million will be used to procure various environmental lab upgrades at EPG (Electronic Proving Ground), WSTC (White Sands Test Center), YTC (Yuma Test Center) and ATC (Aberdeen Test Center). A Large Salt-Fog chamber, fungus chamber and humidity chamber will be procured for EPG. A field refrigeration unit and conditioning chamber will be procured for YTC. Temperature conditioning equipment will be provided to ATC. A Large Salt-Fog chamber will be provided to WSTC along with a refurbished large force shaker. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funds in FY2020 were realigned to higher priority projects to support the Army's modernization priorities. In FY2021, the increase in funds will allow for continued environmental lab upgrades needed at ATEC Test Centers.	3.785	0.776	10.656
Title: 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). This effort supports the Future Vertical Lift Cross-Functional Team. ***FY 2020 Plans:*** Will continue EMD phase contract activity for the SCETI program. In FY2020, this program will complete Emulation Flight Capability installation and acceptance testing; and the design and acceptance testing of Atmospheric Measurement equipment. ***FY 2021 Plans:***	2.862	3.052	5.281

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
Will continue EMD phase for the SCETI Program. In FY2021 funds in the amount of 5.281 Million will be used to provide system integration and completion of the development of the rain degraded visual environment capability. The funds will also be used to develop the fog and snow degraded visual environment capabilities. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY2021 increase for equipment needed for development and integration of fog and snow degraded visual environment capabilities.			
Title: 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. This effort supports Next Generation Combat Vehicle and Future Vertical Lift Cross-Functional Teams. ***FY 2020 Plans:*** Continue market research and acquisition strategy refinement. ***FY 2021 Plans:*** Funds in the amount of 6.500 Million will complete acquisition strategy and begin acquiring equipment needed for testing controlled and autonomous ground and aerial robotic systems at Aberdeen Test Center. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase of funds needed to begin procuring necessary equipment identified during acquisition strategy refinement.	-	1.479	6.500
Title: EMD phase contract activity for ATEC Fiber Modernization ***Description:*** ATEC Fiber Modernization will provide all ATEC Test Centers with a revitalized fiber network to complement the Test Network Modernization (TNM) program. This effort provides test centers with an improved fiber infrastructure to support greater data payloads and increased network reliability. This enterprise effort will replace fiber optic cable at the test centers to extend the lifecycle of the test networks. This effort supports Long Range Precision Fires, Next Generation Combat Vehicle, Network, Air and Missile Defense and Future Vertical Lift Cross-Functional Teams. ***FY 2021 Plans:*** begin market research and creation of acquisition strategy for replacement of fiber network at all ATEC test centers. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** ATEC Fiber modernization is an FY21 new start effort.	-	-	1.000
Title: EMD phase contract activity for Telemetry Systems Modernization	-	-	8.157

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Description: Telemetry Systems Modernization will modernize current outdated telemetry systems located at: White Sands Test Center, Yuma Test Center, Aberdeen Test Center and Redstone Test Center. The modernization of these systems will provide enhanced technical and spectral capability while also providing for a remote controlled operational environment. This effort supports Long Range Precision Fires, Next Generation Combat Vehicle, Air and Missile Defense, and Future Vertical Lift Cross-Functional Teams. ***FY 2021 Plans:*** will complete acquisition strategy and begin replacing obsolete Telemetry system components at Redstone Test Center, Yuma Test Center and White Sands Test Center. This replacement will include Commercial-Off-The-Shelf (COTS) fixed site and mobile telemetry equipment. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Telemetry Systems Modernization is an FY21 new start effort which initiate replacement of COTS telemetry equipment.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC 638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC 638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC 638	-	1.559	-
Accomplishments/Planned Programs Subtotals	21.092	34.342	44.614

	FY 2019	FY 2020
Congressional Add: High Powered Microwave Test and Evaluation Assets ***FY 2020 Plans:*** High Powered Microwave Test and Evaluation Assets	-	10.000
Congressional Adds Subtotals	-	10.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
986: *Major Operational Test Instrumentation*	-	15.150	0.000	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 1.500 million per year or 7.500 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 2019	FY 2020	FY 2021
Title: Integrated Live-Virtual-Constructive (LVC) Test Environment (ILTE) - formerly "Real-Time Casualty Assessment (RTCA)"	15.150	-	-
Description: Complete Block 1 of the Engineering, Manufacturing, and Development (EMD) Phase and acquisition of ILTE capabilities required to conduct Operational Tests.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
Accomplishments/Planned Programs Subtotals	15.150	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
EY9: *Range Radar Replacement Program (RRRP)*	-	22.272	94.760	54.322	-	54.322	12.968	21.380	25.545	33.110	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, the Range Radar Replacement Program (RRRP) recapitalizes and develops modern instrumentation radars to replace obsolete tracking and surveillance radars at U.S. Army Test and Evaluation Command's (ATEC) activities, which include: Aberdeen Test Center (ATC), MD; White Sands Test Center (WSTC), NM; and Yuma Test Center (YTC), AZ. The project will deliver capability in two block increments: Block I will recapitalize or replace existing radar systems, and Block II will develop a Long Range Radar which is compliant with ATEC's Test Capability Requirements Document (TCRD). 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 will improve data collection, thus enhancing development of Army systems being tested at these ranges. The current fleet of instrumentation radars located at ATC, 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 (MCOTS) radars for both the MRR and SRR solutions, and a combination of recapitalization and COTS/MCOTS replacement for the Long Range SOTRs. Also, the project will conduct Engineering and Manufacturing Development (EMD) for upgrading three Long Range MOTRs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: EMD Phase	22.272	90.456	54.322
Description: EMD phase activities for RRRP are designed to provide advanced radar instrumentation suites that meet emerging requirements for developmental testing.			
FY 2020 Plans: Will continue procurement of MRRs and LRRs. Will continue EMD and initial acceptance testing of MPR-39 MOTR and Long range Radar (LRR). Will continue delivery and acceptance testing of MRRs with vendors and ATEC ranges. Procures seven			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
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 2021 Plans:*** Continue procurement of MCOTS long range radars, initiate the EMD phase for the first Block II LRR, and complete acceptance testing of instrumentation radars. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease of $40.438 million is consistent with the strategic plan to align RRRP with developmental testing requirements emerging from Army modernization efforts.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC 638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC 638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC 638	-	4.304	-
Accomplishments/Planned Programs Subtotals	22.272	94.760	54.322

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FA4: *Warrior Injury Assessment Manikin (WIAMan)*	-	13.665	0.000	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 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 2019	FY 2020	FY 2021
Title: WIAMan/ATD	13.665	-	-
Description: This 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.			
Accomplishments/Planned Programs Subtotals	13.665	-	-

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.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FF1: *Cyber Blue Team*	-	0.000	1.216	1.054	-	1.054	1.098	2.261	1.114	1.114	0.000	7.857
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In 2016 the Army Acquisition Executive (AAE) designated the Program Manager for Cyber, and Training (PM CT2) (formerly PM ITTS) as the Office of Primary Responsibility for Cyber Acquisition Blue Teams (CABT) certifications and standards program. This Project executes the establishment and management of certification standards for CABT and coordination of requirements on behalf of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA ALT).

PM CT2 will establish certification standards, certify Blue Teams and maintain a vulnerabilities/lessons learned repository. PM CT2 will work with Blue and Red Teams to establish processes which facilitate open network tests under the red team authority, coordinate with PMs on CABT efforts on behalf of ASA ALT and report to ASA ALT on new cyber vulnerabilities. Blue teams will work cooperatively with acquisition programs to make sure all security measures are taken throughout the program's lifecycle, ensuring cyber resiliency. Blue teams are essential to help military operators assess, protect and defeat the presence of cyber security threats across Army Acquisition Programs.

Will focus on the continuation of certifying candidate teams. The goal is to certify enough teams to allow acquisition programs the flexibility to find a certified Blue Team that meet their program's schedule and cost and can be incorporated early on in the program. CABT vulnerability assessments will provide data analytics to report trends and lessons learned. A web portal will serve as a one stop shop for both candidate and certified Blue teams to obtain and maintain their certification.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Cyber Blue Teams	-	1.161	1.054
Description: Management and oversight of Cyber Blue Team vulnerability assessments.			
FY 2020 Plans: 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 ASA ALT. 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 2021 Plans: Will continue to support the maintenance and operation of a central repository to include trend analysis and lessons learned from vulnerability assessments. The CABT program will also develop and maintain an additional web portal to support and manage both the candidate and the certified teams.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 6	**R-1 Program Element (Number/Name)** PE 0604759A / *Major T&E Investment*	**Project (Number/Name)** FF1 / *Cyber Blue Team*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Decreased in funding due to an anticipated drop in the number of candidate team certification requests after the initial start of team certifications.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC 638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC 638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC 638	-	0.055	-
Accomplishments/Planned Programs Subtotals	-	1.216	1.054

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A