Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
Total Program Element	-	415.104	40.597	45.880	-	45.880	47.871	59.283	58.822	63.661	0.000	731.218
BK8: *Robotics for Engineer Operations Adv Tech*	-	6.197	3.801	4.257	-	4.257	6.054	7.304	2.988	4.519	0.000	35.120
BK9: *Ground System Fluids and Fuels Adv Tech*	-	2.301	6.983	5.605	-	5.605	5.093	5.046	5.082	5.133	0.000	35.243
BL3: *Explosives Forensics Advanced Technology*	-	2.133	2.256	2.285	-	2.285	2.286	2.288	2.313	2.337	0.000	15.898
BL6: *Expedient Passive Protection Advanced Technology*	-	3.546	6.025	5.866	-	5.866	4.189	4.818	5.620	5.945	0.000	36.009
BL8: *Power Projection in A2AD Environments Adv Tech*	-	4.843	3.317	4.132	-	4.132	2.682	3.734	4.422	4.607	0.000	27.737
BM1: *Protection from Advanced Weapon Effects Adv Tech*	-	4.787	4.937	5.142	-	5.142	5.346	5.542	3.980	4.501	0.000	34.235
BO3: *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*	-	383.300	-	-	-	-	-	-	-	-	0.000	383.300
CJ9: *Ground Enabling University Adv Development*	-	3.754	4.214	6.048	-	6.048	6.149	6.152	6.219	6.281	0.000	38.817
CV5: *Engineer Enablers Maneuver, LOG, & Sustainment Adv*	-	2.446	3.313	4.818	-	4.818	2.705	5.568	5.543	7.470	0.000	31.863
DA2: *SAFR Alternatives for Readiness Advanced Tech*	-	1.797	2.926	3.979	-	3.979	8.523	9.791	9.941	10.040	0.000	46.997
DG2: *Advanced Development of Obscurants*	-	-	2.825	2.832	-	2.832	2.835	2.837	2.840	2.868	0.000	17.037
DI8: *Environmental Security Resilience Adv Tech*	-	-	-	0.315	-	0.315	1.258	5.251	8.972	9.150	0.000	24.946
DI9: *Comprehensive Adapt Operational Energy Adv Tech*	-	-	-	0.601	-	0.601	0.751	0.952	0.902	0.810	0.000	4.016

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army	Date: March 2024
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*

Note

In Fiscal Year 2025 (FY25), funding in the amount of $0.315 million was realigned within PE 0603119A / Ground Advanced Technology from project DA2 / SAFR Alternatives for Readiness Advanced Tech to project DI8 / Environmental Security Resilience Adv Tech.

In FY25, project DI9 / Comprehensive Adapt Operational Energy Adv Tech is a new start within the Ground Advanced Technology program.

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates ground movement and maneuver technologies that support and enable the Army's modernization priority for the Next Generation of Combat Vehicles. This PE also matures, integrates and demonstrates advanced technologies that are necessary and foundational for legacy and future ground platforms and ground maneuver. These technology areas include: robotic and autonomous Army Combat Engineer equipment, liquid logistics (i.e., fuels, lubricants, and oils) and related monitoring and distribution, forensic analysis of explosives and other chemical materials, rapidly deployable passive protection technologies, entry and maneuver assessment technologies and structural hardening technologies to protect personnel and critical assets from advanced weapon effects.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas in support of the National Defense Strategy.

Research is performed by the United States (U.S.) Army Futures Command and the U.S. Army Engineer Research and Development Center.

Research in this PE complements PE 0602144A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology), and PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

B. Program Change Summary ($ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	415.846	40.597	42.661	-	42.661
Current President's Budget	415.104	40.597	45.880	-	45.880
Total Adjustments	-0.742	0.000	3.219	-	3.219
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.001	-			
• SBIR/STTR Transfer	-0.743	-			
• Adjustments to Budget Years	-	-	3.219	-	3.219

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army	Date: March 2024
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Project: BO3: *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*		
Congressional Add: *Secure Management of Energy Generation and Storage*	5.000	-
Congressional Add: *Materials and Manufacturing Technology for Cold Environments*	4.000	-
Congressional Add: *Program Increase - Rapid Entry and Sustainment for the Arctic*	10.000	-
Congressional Add: *Program Increase - Water Quality and Resiliency*	7.000	-
Congressional Add: *Program Increase - Clean Modular Hydro Technology*	20.000	-
Congressional Add: *Program Increase - Accelerator Technology for Ground Maneuver*	4.000	-
Congressional Add: *Program Increase - Impacts of Soil Structures on Hydrology*	6.000	-
Congressional Add: *Program Increase - Cross-Laminated Timber and Recycled Carbon Fiber Materials*	5.500	-
Congressional Add: *Anticipating Threats to Natural Systems*	6.000	-
Congressional Add: *Army Visual and Tactical Arctic Reconnaissance*	4.000	-
Congressional Add: *Autonomous Construction and Manufacturing*	5.000	-
Congressional Add: *Cold Weather Research*	4.000	-
Congressional Add: *Expeditionary Additive Construction*	15.000	-
Congressional Add: *Frost Heave Effects Monitoring*	6.000	-
Congressional Add: *Graphene Applications for Military Engineering*	10.000	-
Congressional Add: *Hardened Facility Standards*	5.500	-
Congressional Add: *High Power Fast Charging for Electric Vehicle Fleets*	5.000	-
Congressional Add: *Low Carbon Hydrogen Technologies*	10.000	-
Congressional Add: *Microgrid Reliability and Resiliency*	6.500	-
Congressional Add: *Military Waste Stream Conversion*	5.000	-
Congressional Add: *Power Generation for Increased Facility Resilience Pilot*	10.000	-
Congressional Add: *Power Projection*	5.000	-
Congressional Add: *Water Reuse Consortium*	10.000	-
Congressional Add: *Program Increase - ADDITIVE MANUFACTURING AND 3D PRINTING FOR DEPLOYABLE SHELTERS*	6.000	-
Congressional Add: *Program Increase - ADDITIVE MANUFACTURING FOR WEAPONS AND ARMAMENTS COMPONENTS*	10.000	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army	Date: March 2024
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Congressional Add: *Program Increase - ADVANCED MULTI-STACK OLED MICRODISPLAYS*	8.800	-
Congressional Add: *Bio-derived coatings for high-performance applications*	2.000	-
Congressional Add: *Expanding engineering with nature installation capacity*	5.000	-
Congressional Add: *Mass timber applications for military construction projects*	12.000	-
Congressional Add: *Novel materials for smart infrastructure systems*	6.000	-
Congressional Add: *Rapid infrastructure development and engineering*	5.000	-
Congressional Add: *Ultra-high strength steels for construction applications*	6.000	-
Congressional Add: *Always ready distributed energy*	10.000	-
Congressional Add: *Self contained power for towers and sensors*	10.000	-
Congressional Add: *Ruggedized deployable solar generators*	10.000	-
Congressional Add: *PFAS destruction industrial SCWO technology*	12.000	-
Congressional Add: *Sorbent enhanced clean hydrogen demonstration*	15.000	-
Congressional Add: *3D Printing of infrastructure - enabling cold weather construction capabilities*	5.000	-
Congressional Add: *Advanced coating development for infrastructure*	3.000	-
Congressional Add: *Arctic terrain sensing with drone platforms*	10.000	-
Congressional Add: *Cobalt free batteries*	3.000	-
Congressional Add: *Competition planning and evaluation infrastructure*	8.000	-
Congressional Add: *Delivered fuel decarbonization and resiliency*	5.000	-
Congressional Add: *Engineering practices for ecosystem design solutions*	6.500	-
Congressional Add: *Innovative design and manufacturing of advanced composites/multi material protective systems*	10.000	-
Congressional Add: *Logistically secure energy resources for resilient installation and mobility infrastructure*	5.000	-
Congressional Add: *Military Operations in permafrost environment*	3.500	-
Congressional Add: *Military training grounds research to support force readiness*	7.000	-
Congressional Add: *Operational and cyber resilient power for critical infrastructure*	8.000	-
Congressional Add: *Rapid Track repair*	3.000	-
Congressional Add: *Solid State rechargeable lithium batteries*	5.000	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army	Date: March 2024
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603119A *I Ground Advanced Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2023	FY 2024
Congressional Add: *Sustainable distributed electric vehicle charging station*	3.000	-
Congressional Add: *Technology pilot for reliability, resilience, and energy efficiency*	3.000	-
Congressional Add: *Wildfire engineering for sustainability and resiliency*	6.000	-
Congressional Add: *Zero emission concrete*	3.000	-
Congressional Add Subtotals for Project: BO3	383.300	-
Congressional Add Totals for all Projects	383.300	-

Change Summary Explanation

Funding increase is due to realignment for advanced obscurants from 0602144A (Ground Technology) / BL2 (Explosives Forensics Technology).

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) BK8 / *Robotics for Engineer Operations Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BK8: *Robotics for Engineer Operations Adv Tech*	-	6.197	3.801	4.257	-	4.257	6.054	7.304	2.988	4.519	0.000	35.120
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates robotic engineer equipment capabilities that can remotely characterize the environment and operate in the battlespace for autonomous Combat Engineer actions. This Project provides technologies for Combat Engineer mission planning, creating or reducing barriers and obstacles, as well as maintaining, repairing, and constructing expedient infrastructure. These efforts will enhance Combat Engineer missions of mobility, counter mobility, and survivability through semi-autonomous or autonomous operations.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project BK7 (Robotics for Engineer Operations Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas.

Work in this Project is performed by the United States Army Engineer Research and Development Center Construction Engineering Research Laboratory, Information Technology Laboratory, and Geotechnical and Structures Laboratory

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Beyond-Visual-Line-of-Sight Tele-operated Engineer Operations Demonstration	6.197	-	-
Description: This effort matures and demonstrates remote control and semi-autonomous behaviors on small scale construction equipment to provide information that scales to larger legacy equipment as well as assess the applicability of small scale equipment working in collaboration and coordination.			
Title: Semi-Autonomous Engr Ops Demonstration	-	3.801	4.257
Description: This effort matures and demonstrates machine tool behaviors to perform semi-autonomous shaping of the terrain through physical interaction with the environment (push, pull, lift, and dig). The effort develops the necessary decision-making, data fusion, localization, and inter-platform communication to allow semi-autonomy on commercial off the shelf (COTS) equipment.			
FY 2024 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BK8 / *Robotics for Engineer Operations Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will implement, mature, and demonstrate the required sensor payload, onboard processing, and control algorithms on heavy Engineer equipment to enable semiautonomous operations within an area of interest; mature and demonstrate semi-autonomous execution of a simple Engineer task. ***FY 2025 Plans:*** Will demonstrate and validate semiautonomous on-site operation of heavy Engineer equipment through Soldier assessment; will demonstrate and validate semiautonomous execution of a simple Engineer task through Soldier assessment. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects the planned addition of workflows for this effort as technologies are transitioned for maturation and demonstration from PE 0602144A, Project BK7 Robotics for Engineer Operations Technology.			
Accomplishments/Planned Programs Subtotals	6.197	3.801	4.257

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) BK9 / *Ground System Fluids and Fuels Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BK9: *Ground System Fluids and Fuels Adv Tech*	-	2.301	6.983	5.605	-	5.605	5.093	5.046	5.082	5.133	0.000	35.243
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates liquid logistics technologies such as enhanced jet fuels, lubricants, oils, powertrain fluids, coolants, bulk fluid treatment, monitoring, metering, storage, and distribution in support of established Army regulations and requirements. This Project improves products and technologies to optimize fuel efficiency, meet new hardware fluid requirements, modernize fluids, ensure bulk fluid meets quality requirements, and provide bulk fluid asset visibility, to optimize logistics and reduce logistics requirements. This Project executes the demonstration of enhanced jet fuels for ground systems, enhanced performance coolants, fluids for vehicle electrification, and smart bulk fuel metering and monitoring technologies. This Project improves liquid logistics products and technologies that are critical enablers for multi-domain operations requiring semi-independent operations to enable dispersed operations to extend operational reach, prolong endurance and allow freedom of action for the Joint Force.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas.

Work in this Project is performed by the Ground Vehicle System Center (GVSC)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Ground System Fluids and Fuels	2.301	6.983	5.605
Description: This effort focuses on reducing the logistics footprint, improving fuel efficiency, and ensuring mobility by maturing and demonstrating technologies in areas such petroleum quality monitoring, filtration, storage and distribution, hydraulic fluids; enhanced jet fuels and fuel additives, lubricants, oil, powertrain fluids and coolants. Validates candidate engine coolants that extend change intervals, reduce corrosion, and minimize incompatibility issues for military use. Establish performance requirements for new military thermal fluids that enable emerging vehicle electrification technology. Integrate smart fuel metering technology into self-correcting devices that automatically report fuel quantity and conduct fuel filter effectiveness testing to establish fuel particle contamination limits for new fuel monitoring technology. ***FY 2024 Plans:*** Will verify the fuel lubricity additive correlation from bench scale through test rig by assessing a second type of pump design; conduct field demonstration of selected engine coolants; conduct bench top testing of thermal management fluids for vehicle			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BK9 / *Ground System Fluids and Fuels Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
electrification to evaluate and down-select fluid candidates; update smart meter design based on baseline evaluation, add tank level monitoring, and assess fuel dashboard and data transfer performance. ***FY 2025 Plans:*** Will conduct simulated service test and field demonstration of thermal management fluids for vehicle electrification. Will identify candidate lubricants for vehicle electrification applications. Will conduct hardware and software integration test for smart fuel metering. Will conduct technical performance test of fuel additive detection and quantification analyzer. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects narrowed focus on development of thermal fluids for vehicle electrification.			
Accomplishments/Planned Programs Subtotals	2.301	6.983	5.605

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*				Project (Number/Name) BL3 / *Explosives Forensics Advanced Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BL3: *Explosives Forensics Advanced Technology*	-	2.133	2.256	2.285	-	2.285	2.286	2.288	2.313	2.337	0.000	15.898
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This will mature and demonstrate instrumentation and algorithms required to provide improved point, proximity, and stand-off detection of low levels of explosives and solid chemical hazards. This will enable the warfighter to integrate portable chemical and explosive hazard detection equipment. This project will also integrate explosive detection into the family of Chemical, Biological, Radiological, and Nuclear point and stand-off sensors, alternative chemical detection modalities and algorithms, that will improve the probability of detection and attribution of an explosive hazard or home-made explosive manufacturing/assembly location.

Work in this project compliments Program Element (PE) 0602144A (Ground Technology) / Project BL2 (Explosives Forensics Technology)

The cited work is consistent with the Under Secretary of Defense Research and Engineering priority focus.

Work in this Project is performed by the Chemical Biological Center (CBC)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Detection Mechanisms for Contaminants	2.133	2.256	2.285
Description: This effort matures and demonstrates improved point and standoff detection of military and homemade explosives and their precursors, and other chemicals and hazardous materials. ***FY 2024 Plans:*** Will demonstrate second generation build of Portable Chemical Fingerprint Identification System (PCFIS) for trace level chemical hazard detection of contaminated surfaces; demonstrate improved explosive and chemical vapor detection utilizing first of its kind waveguide enhanced Raman spectroscopy portable device; continue advancements of novel optical and non-optical sensor methodologies for trace and forensic level information more forward in the field. ***FY 2025 Plans:*** Will transition the Portable Microscopy Chemical Detection System (PMCDS) for semi-autonomous detection of solid chemical hazards on surfaces. Will optimize and demonstrate the second integrated package for the waveguide enhanced Raman spectroscopy vapor detection system and provide new advanced optical and non-optical methodologies and technology for forensic level detection of chemical hazards. ***FY 2024 to FY 2025 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BL3 / *Explosives Forensics Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Funding change reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	2.133	2.256	2.285

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) BL6 / *Expedient Passive Protection Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BL6: *Expedient Passive Protection Advanced Technology*	-	3.546	6.025	5.866	-	5.866	4.189	4.818	5.620	5.945	0.000	36.009
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates rapidly deployable protection solutions to protect small distributed units, decision support applications and software, and tactics, techniques, and procedures to increase the survivability of personnel, critical assets, and facilities from a range of threats. Force protection technologies will be matured and demonstrated for applications in complex and urban environments to protect against advanced energetic threats, large caliber rockets and missiles, and other emerging weapons.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project BL5 (Expedient Passive Protection Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas.

Work in this Project is performed by the United States Army Engineer Research and Development Center Geotechnical and Structures Laboratory.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Assessments of Solutions for Survivability from Emerging Threats Demonstrations	3.546	6.025	5.866
Description: This effort matures and demonstrates both legacy and newly developed expedient force protection solutions for emerging threats such as large caliber rocket and missile weapon effects and UAV threats. This effort also demonstrates algorithms for decision support applications and software, and informs tactics, techniques, and procedures (TTP's) to increase the survivability of personnel, critical assets, and facilities against emerging threats. It will enable the Warfighter to select protection schemes for survivability from emerging threats to support Multi-Domain Operations.			
FY 2024 Plans: Will optimize protective designs of expedient protective structures; will demonstrate capabilities of expedient protective structures to defeat blast and fragmentation effects of emerging threats; and will demonstrate fast-running algorithms to predict emerging threat effects.			
FY 2025 Plans: Will demonstrate and validate rapidly deployable protection systems against emerging threats, such as large caliber rockets and weaponized unmanned aerial vehicles (UAVs), to provide expedient passive protection to critical semi-fixed assets and facilities.			
FY 2024 to FY 2025 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BL6 / *Expedient Passive Protection Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Funding decrease reflects the planned workflows for this effort.			
Accomplishments/Planned Programs Subtotals	3.546	6.025	5.866

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army										Date: March 2024		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*				Project (Number/Name) BL8 / *Power Projection in A2AD Environments Adv Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BL8: *Power Projection in A2AD Environments Adv Tech*	-	4.843	3.317	4.132	-	4.132	2.682	3.734	4.422	4.607	0.000	27.737
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates remote assessment technologies to determine entry and maneuver corridors, provides site selection tools and decision support technologies for all climates in all season conditions including aviation site- selection tools, enhanced automated route reconnaissance technologies, mobility models for extreme climates, and road capacity assessment technologies. These technologies will reduce reliance on manned on-site reconnaissance for force projection assessments and provide all-season predictions to ensure air and ground battlespace entry and maneuver. This Project also matures and demonstrates material solutions to repair, rebuild, and construct infrastructure required for movement and maneuver in highly contested, complex operational environments such as Anti-Access/Area Denial.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project BL7 (Power Projection in A2AD Environments Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas.

Work in this Project is performed by the United States Army Engineer Research and Development Center Geotechnical and Structures Laboratory.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2023**	**FY 2024**	**FY 2025**
Title: Entry and Sustainment in Complex Contested Environments Demonstrations ***Description:*** This effort matures and demonstrates geospatial planning tools to expand engineering analysis of ground surfaces for entry, sustainment, and maneuver operations and to automate processes for selecting suitable maneuver corridors.	3.242	-	-
Title: Engineering for Battlespace Maneuver Demonstrations ***Description:*** This effort demonstrates material solutions and techniques for expedient repair to rapidly repair and upgrade damaged infrastructure along mobility corridors and restaging areas to maintain and enhance freedom of maneuver achieving overmatch and tactical advantage in contested complex environments. ***FY 2024 Plans:*** Will demonstrate mechanical reinforcing materials for ground / soil stabilization; demonstrate matting solutions for supporting military vehicle loads over soft soils; finalize techniques for chemical soil stabilization agents. ***FY 2025 Plans:***	1.601	3.317	4.132

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BL8 / *Power Projection in A2AD Environments Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will demonstrate planning tools for predicting route degradation and for when tasking route repair and upgrades will be required; will demonstrate suite of technologies for performing rapid route remediation to support ground maneuver operations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects planned conclusion of this effort as technologies are transitioned for maturation and demonstration from PE 0602144A (Ground Technology) / Project BL7 (Power Projection in A2AD Environments Technology).			
Accomplishments/Planned Programs Subtotals	4.843	3.317	4.132

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) BM1 / *Protection from Advanced Weapon Effects Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
BM1: *Protection from Advanced Weapon Effects Adv Tech*	-	4.787	4.937	5.142	-	5.142	5.346	5.542	3.980	4.501	0.000	34.235
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates structural hardening solutions and force protection technologies to increase survivability of facilities and provide critical updates to protective design specifications and guidance. Additionally, this project matures and demonstrates passive protection technologies and provides protective design criteria advancements to mitigate attack from emerging advanced threats.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project BL9 (Protection from Advanced Weapon Effects Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas.

Work in this Project is performed by the United States Army Engineer Research and Development Center Geotechnical and Structures Laboratory.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Defeat of Complex Attack Demonstrations ***Description:*** This effort demonstrates force protection technologies that mitigate the effects of emerging peer and near peer adversaries advanced penetration threats and high yield blast effects by optimizing high-performance, logistically feasible material solutions and processes.	4.787	-	-
Title: Protection from Advanced Penetrators Demonstration ***Description:*** This effort matures and demonstrates passive protective designs and concepts for hardened structures and critical assets that mitigate the effects of advanced precision threat weapons of peer and near peer adversaries through focused subscale to full-scale demonstrations. ***FY 2024 Plans:*** Will demonstrate protection of current structural hardening solutions against a sub-scale advanced penetrator to provide baseline performance and to identify and investigate current facility criteria deficiencies for advanced penetrating weapons. ***FY 2025 Plans:***	-	4.937	5.142

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BM1 / *Protection from Advanced Weapon Effects Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will optimize advanced protective materials and structural members to mitigate penetration and perforation from increased velocity advanced penetrator threats. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects planned demonstration activities for this effort.			
Accomplishments/Planned Programs Subtotals	4.787	4.937	5.142

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army												Date: March 2024
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*				Project (Number/Name) BO3 / *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
BO3: *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*	-	383.300	-	-	-	-	-	-	-	-	0.000	383.300
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Congressional Interest Item funding provided for Military Engineering Technology Demonstration.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
Congressional Add: Secure Management of Energy Generation and Storage ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Secure Management of Energy Generation and Storage.	5.000	-
Congressional Add: Materials and Manufacturing Technology for Cold Environments ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Materials and Manufacturing Technology for Cold Environments.	4.000	-
Congressional Add: Program Increase - Rapid Entry and Sustainment for the Arctic ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Rapid Entry and Sustainment for the Arctic.	10.000	-
Congressional Add: Program Increase - Water Quality and Resiliency ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Water Quality and Resiliency Technologies.	7.000	-
Congressional Add: Program Increase - Clean Modular Hydro Technology ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Clean Modular Hydro Technology	20.000	-
Congressional Add: Program Increase - Accelerator Technology for Ground Maneuver	4.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BO3 / *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
FY 2023 Accomplishments: Congressional Interest Item funding provided for Accelerator Technology for Ground Maneuver.		
Congressional Add: Program Increase - Impacts of Soil Structures on Hydrology ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Impacts of Soil Structures on Hydrology.	6.000	-
Congressional Add: Program Increase - Cross-Laminated Timber and Recycled Carbon Fiber Materials ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Cross-Laminated Timber and Recycled Carbon Fiber Materials.	5.500	-
Congressional Add: Anticipating Threats to Natural Systems ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Anticipating Threats to Natural Systems.	6.000	-
Congressional Add: Army Visual and Tactical Arctic Reconnaissance ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Army Visual and Tactical Arctic Reconnaissance.	4.000	-
Congressional Add: Autonomous Construction and Manufacturing ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Autonomous Construction and Manufacturing.	5.000	-
Congressional Add: Cold Weather Research ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Cold Weather Research.	4.000	-
Congressional Add: Expeditionary Additive Construction ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Expeditionary Added Construction.	15.000	-
Congressional Add: Frost Heave Effects Monitoring ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Frost Heave Effects Monitoring.	6.000	-
Congressional Add: Graphene Applications for Military Engineering	10.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BO3 / *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
FY 2023 Accomplishments: Congressional Interest Item funding provided for Graphene Applications for Military Engineering.		
Congressional Add: Hardened Facility Standards ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Hardened Facility Standards.	5.500	-
Congressional Add: High Power Fast Charging for Electric Vehicle Fleets ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Electric Vehicle Fleets.	5.000	-
Congressional Add: Low Carbon Hydrogen Technologies ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Low Carbon Hydrogen Technologies.	10.000	-
Congressional Add: Microgrid Reliability and Resiliency ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Microgrid Reliability and Resiliency.	6.500	-
Congressional Add: Military Waste Stream Conversion ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Military Waste Stream Conversion	5.000	-
Congressional Add: Power Generation for Increased Facility Resilience Pilot ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Power Generation for Increased Facility Resilience Pilot	10.000	-
Congressional Add: Power Projection ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Power Projection.	5.000	-
Congressional Add: Water Reuse Consortium ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Water Reuse Consortium.	10.000	-
Congressional Add: Program Increase - ADDITIVE MANUFACTURING AND 3D PRINTING FOR DEPLOYABLE SHELTERS	6.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BO3 / *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
FY 2023 Accomplishments: Congressional Interest Item funding provided for ADDITIVE MANUFACTURING AND 3D PRINTING FOR DEPLOYABLE SHELTERS		
Congressional Add: Program Increase - ADDITIVE MANUFACTURING FOR WEAPONS AND ARMAMENTS COMPONENTS ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for ADDITIVE MANUFACTURING FOR WEAPONS AND ARMAMENTS COMPONENTS	10.000	-
Congressional Add: Program Increase - ADVANCED MULTI-STACK OLED MICRODISPLAYS ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for ADVANCED MULTI-STACK OLED MICRODISPLAYS	8.800	-
Congressional Add: Bio-derived coatings for high-performance applications ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for bio-derived coatings for high-performance applications.	2.000	-
Congressional Add: Expanding engineering with nature installation capacity ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Engineering with Nature.	5.000	-
Congressional Add: Mass timber applications for military construction projects ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for mass timber applications for military construction projects.	12.000	-
Congressional Add: Novel materials for smart infrastructure systems ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for novel materials for smart infrastructure systems.	6.000	-
Congressional Add: Rapid infrastructure development and engineering ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for novel materials for rapid infrastructure development and engineering.	5.000	-
Congressional Add: Ultra-high strength steels for construction applications ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for ultra-high strength steels for construction applications.	6.000	-
Congressional Add: Always ready distributed energy	10.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BO3 / *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
FY 2023 Accomplishments: Congressional Interest Item funding provided for always ready distributed energy.		
Congressional Add: Self contained power for towers and sensors ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for self contained power for towers and sensors.	10.000	-
Congressional Add: Ruggedized deployable solar generators ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for ruggedized deployable solar generators.	10.000	-
Congressional Add: PFAS destruction industrial SCWO technology ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for PFAS destruction industrial SCWO technology	12.000	-
Congressional Add: Sorbent enhanced clean hydrogen demonstration ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for sorbent enhanced clean hydrogen demonstration.	15.000	-
Congressional Add: 3D Printing of infrastructure - enabling cold weather construction capabilities ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for 3D Printing of infrastructure - enabling cold weather construction capabilities.	5.000	-
Congressional Add: Advanced coating development for infrastructure ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for advanced coating development for infrastructure.	3.000	-
Congressional Add: Arctic terrain sensing with drone platforms ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Arctic terrain sensing with drone platforms.	10.000	-
Congressional Add: Cobalt free batteries ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for cobalt free batteries.	3.000	-
Congressional Add: Competition planning and evaluation infrastructure	8.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BO3 / *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
FY 2023 Accomplishments: Congressional Interest Item funding provided for competition planning and evaluation infrastructure.		
Congressional Add: Delivered fuel decarbonization and resiliency ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for delivered fuel decarbonization and resiliency.	5.000	-
Congressional Add: Engineering practices for ecosystem design solutions ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Engineering practices for ecosystem design solutions.	6.500	-
Congressional Add: Innovative design and manufacturing of advanced composites/multi material protective systems ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for innovative design and manufacturing of advanced composites/multi material protective systems.	10.000	-
Congressional Add: Logistically secure energy resources for resilient installation and mobility infrastructure ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for logistically secure energy resources for resilient installation and mobility infrastructure.	5.000	-
Congressional Add: Military Operations in permafrost environment ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Military Operations in permafrost environment.	3.500	-
Congressional Add: Military training grounds research to support force readiness ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Military training grounds research to support force readiness.	7.000	-
Congressional Add: Operational and cyber resilient power for critical infrastructure ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for operational and cyber resilient power for critical infrastructure.	8.000	-
Congressional Add: Rapid Track repair ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for Rail Road Rapid Track repair.	3.000	-
Congressional Add: Solid State rechargeable lithium batteries	5.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** BO3 / *MILITARY ENGINEERING TECHNOLOGY DEMONSTRATION (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024
FY 2023 Accomplishments: Congressional Interest Item funding provided for Solid State rechargeable lithium batteries.		
Congressional Add: Sustainable distributed electric vehicle charging station ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for sustainable distributed electric vehicle charging station.	3.000	-
Congressional Add: Technology pilot for reliability, resilience, and energy efficiency ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for technology pilot for reliability, resilience, and energy efficiency.	3.000	-
Congressional Add: Wildfire engineering for sustainability and resiliency ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for wildfire engineering for sustainability and resiliency.	6.000	-
Congressional Add: Zero emission concrete ***FY 2023 Accomplishments:*** Congressional Interest Item funding provided for zero emission concrete.	3.000	-
Congressional Adds Subtotals	383.300	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) CJ9 / *Ground Enabling University Adv Development*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CJ9: *Ground Enabling University Adv Development*	-	3.754	4.214	6.048	-	6.048	6.149	6.152	6.219	6.281	0.000	38.817
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Project matures and demonstrates advanced developments and technological innovations from academia, in the focus areas of ground autonomy, Artificial Intelligence / Machine Learning (AI/ML) and robotics, occupant/vehicle survivability and other ground platform technologies of importance to the Army, by maturing and demonstrating technologies with the goal of delivering technology to the warfighter more quickly. This Project matures and demonstrates advanced technologies with a focus on mid to far-term Army modernization priorities while also maintaining delivery of near-term technologies critical to the next generation combat vehicles. This Project focuses on maturation and demonstration of various advanced technologies originating from extramural applied research in academia pertaining to navigation/ routing, autonomous robotic vehicles with the use of artificial intelligence and machine learning as applied to ground mobility and maneuver, and other innovative ground enabling applied research technologies. This Project also matures and demonstrates advanced technologies leading to potential emerging capabilities in areas of strategic importance to the Army in autonomy, robotics and AI/ML, protection of both platform and occupant, and other ground platform technologies in propulsion, survivability, powertrain, etc., by bringing competitively selected Universities with research and development teams into Technical Alliances.

Work in this Project complements Program Element (PE) 0620144A (Ground Technology), PE 0602145A (Next Generation Combat Vehicle Technology) and PE 0603462A (Next Generation Combat Vehicle Advanced Technology).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas.

Work in this Project is performed by the University Technology Development Division.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Robust autonomous capabilities for ground vehicles	1.887	2.128	3.874
Description: This effort demonstrates AI/ML and autonomous mobility integrated into ground vehicles to conduct off-road maneuvers to enable the transition from teleoperation to autonomous or semi-autonomous scenarios. Research is conducted in collaboration with university partners to advance autonomous mobility and protection of both occupant and platform in optionally manned and autonomous ground vehicles.			
FY 2024 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** CJ9 / *Ground Enabling University Adv Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Matures and demonstrates multiagent air and ground vehicle teams and situational awareness, beyond existing behaviors, including teams of up to three ground vehicles and five air vehicles. Matures and demonstrates marsupial robot deployment and recovery with increased automation and intelligence. ***FY 2025 Plans:*** Will mature and demonstrate collaborative reconnaissance and surveillance between both ground vehicles and air vehicles and operations with priority switching; mature and demonstrate improvements based on lessons learned from previous Combat Vehicle Robotic (CoVeR) Engineering Evaluation Tests (EET); mature and demonstrate Army Research Lab's Semantic World Model incorporated in the Robotic Technical Kernel (RTK) or current Army robotic software package; demonstrates robotic capabilities in annual CoVeR EET; matures and demonstrates advanced marsupial deployment and recover technologies; validate a process of integrating early-stage academic solutions directly into Army navigation software. The benefits of this effort include an increase in the speed of robotic capability delivered to the Ground Vehicle Systems Center's CoVeR project and long-term reduction in required human-robot interaction. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects the planned milestones for development and participation in Combat Vehicle Robotic (CoVeR) Engineering Evaluation Tests (EET).			
Title: Human-robot/AI interactions ***Description:*** This effort matures, integrates, and demonstrates systems involving physical and cognitive levels of interactions between humans and robots, with the use of reinforcement machine learning which uses human feedback, learning from demonstrations, and safe human-aware controllers. Work is conducted in collaboration with university partners to advance autonomous mobility as well as other areas of ground platform technologies in propulsion, survivability, powertrain, sensing, and perception. ***FY 2024 Plans:*** Demonstrates AI/ML methods for robust autonomous capabilities, cooperative tactical reasoning, real-time basic feature extraction, multi-robot long-term autonomy, human-AI collaboration, human-in-the-loop ML for autonomous navigation. ***FY 2025 Plans:*** Will mature and demonstrate sensing, contact-capable navigation, and activity recognition for vehicles to move without stopping among crowds; continue to mature and demonstrate AI/ML methods for robust autonomous capabilities, cooperative tactical reasoning, real-time basic feature extraction, multi-robot long-term autonomy, human-AI collaboration, human-in-the-loop ML for	1.867	2.086	2.174

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** CJ9 / *Ground Enabling University Adv Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
autonomous navigation; Matures and demonstrates emerging technologies in human-robot interaction. The benefit of this effort is improvements to machine learning and artificial intelligence with human-robotic interactions. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	3.754	4.214	6.048

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*				Project (Number/Name) CV5 / *Engineer Enablers Maneuver, LOG, & Sustainment Adv*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
CV5: *Engineer Enablers Maneuver, LOG, & Sustainment Adv*	-	2.446	3.313	4.818	-	4.818	2.705	5.568	5.543	7.470	0.000	31.863
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates joint contested logistics operations technologies and provides capabilities to operate in disbersed battlefield operations and support sustainment operations through predicted dynamic scenario development that provides critical vulnerabilities assessment and methods/equipment to mitigate potential issues.

Work in this Project complements Program Element (PE) 0602144A (Ground Technology) / Project CV3 (Engineer Enablers Maneuver, LOG, & Sustainment Apl).

The work cited is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas.

Work is performed by the United States Army Engineer Research and Development Center Geotechnical and Structures Laboratory, Geospatial Research Laboratory, Coastal and Hydraulics Laboratory and Information Technology Laboratory.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Sustainment Planning Tool	2.446	2.884	3.085
Description: This effort will mature and demonstrate map-based sustainment running estimates for the prepositioning of survivable material stockpiles based on synchronized ops/intel/log running estimates and informed by artificial intelligence (AI)-based edge computing analyses.			
FY 2024 Plans: Will conduct agile design review with Program Manager Mission Command to evaluate optimized estimation model within Joint Planning Services. Will further mature and optimize with authoritative data sources in advance of integrating capability to the Command Post Computing Environment (CPCE).			
FY 2025 Plans: Will demonstrate an integrated map-based mission planning Sustainment Running Estimate (SRE) toolset that allows a user to visualize sustainment routes and generate reports based on estimates and assessments. These features leverage previous work completed in the sustainment Requirements and Distribution toolset, which includes iterative improvements based on user feedback. Will leverage the Command Post Computing Environment (CPCE) Data Fabric and integration with the LOGSTAT			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** CV5 / *Engineer Enablers Maneuver, LOG, & Sustainment Adv*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
tool to provide CPCE interoperability. The SRE tools will be deployed within the DoD's Joint Planning Services platform for sustainment operations and transitioned into the CPCE Program of Record (POR). ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects the planned workflows for this effort.			
Title: Planning Logistics Analysis Network System Advanced Research ***Description:*** This effort demonstrates new engineering applications and methodologies that support improved distributed logistics planning via multi-modal transportation networks, such as road, ship and train, to improve the efficiency and effectiveness of the planning decision making during contested logistics scenarios. ***FY 2024 Plans:*** Will improve system performance through integration of transportation throughput options through the nodes and routes. ***FY 2025 Plans:*** Will demonstrate beta version of route planning software for the most mature single transportation modality, producing multiple routing options for distributed logistics planning operations. Will mature additional transportation modalities as well as the interface for integration with Army Mission Command Systems. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects planned additional workflows for this effort as it begins to demonstrate route planning software.	-	0.429	1.733
Accomplishments/Planned Programs Subtotals	2.446	3.313	4.818

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) DA2 / *SAFR Alternatives for Readiness Advanced Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
DA2: *SAFR Alternatives for Readiness Advanced Tech*	-	1.797	2.926	3.979	-	3.979	8.523	9.791	9.941	10.040	0.000	46.997
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates cross-cutting, safer alternative advanced technologies that enable warfighter readiness. These technologies also support product availability, Soldier and worker safety, and a reduced environmental footprint in the manufacturing, maintenance, and use of ground vehicles and other Army weapon systems. The Project matures and optimizes safer alternatives in technology areas including surface finishes, coatings, solvents, refrigerants, and fire suppressants. This research addresses the growing impacts to health and readiness associated with carcinogens such as hexavalent chromium, global warming chemicals including hydrofluorocarbons (HFCs), and forever chemicals such as like per- and polyfluoroalkyl substances (PFAS). This Project enables the Army to assess and resolve these types of emerging and continually evolving risks throughout the full life cycle of Army systems.

This Project complements and transitions technologies developed under Program Element (PE) 0602144A (Ground Technology) /Project DA1 (SAFR Alternatives for Readiness Applied Research).

Work in this Project is performed by the Army Research Laboratory (ARL); the Armaments Center; the Aviation and Missile Center (AVMC); the Soldier Center (SC), and the Ground Vehicle Systems Center (GVSC)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Safer Alternatives for Readiness (SAFR) Advanced Technology	1.797	2.926	3.979
Description: Mature and demonstrate safer alternative advanced technologies to replace hexavalent chromium, cadmium and other harmful chemicals during surface finishing; reduce the use of volatile organic compounds and other hazardous materials in coating and depainting processes; and ensure the availability of compatible next generation refrigerants and fire suppressants with low global warming potential.			
FY 2024 Plans: Will mature lead-free rocket motor propellants; demonstrate novel nitration methods for energetic materials; optimize more efficient fuels and lubricants to reduce emissions.			
FY 2025 Plans: Will demonstrate synthesis processes for emerging energetic materials; will mature alternatives to phthalates in gun propellants; and will optimize explosion suppressants that do not rely on restricted HFCs for use in crew compartments. Will demonstrate synthesis processes for emerging energetic materials using novel nitration methods; mature alternatives to endocrine disrupting			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** DA2 / *SAFR Alternatives for Readiness Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
phthalates used in gun propellants to improve the mechanical properties of the propellants; and optimize explosion suppressants that do not rely on restricted HFCs for use in crew compartments. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	1.797	2.926	3.979

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) DG2 / *Advanced Development of Obscurants*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
DG2: *Advanced Development of Obscurants*	-	-	2.825	2.832	-	2.832	2.835	2.837	2.840	2.868	0.000	17.037
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Project matures and demonstrates obscurant technologies with potential to enhance personnel and platform survivability by degrading threat force surveillance sensors and defeating the enemy's target acquisition devices, missile guidance, and directed energy weapons. Dissemination systems for new and improved obscurants are developed with the goal of providing efficient and safe screening of deployed forces.

Work in this project compliments Program Element (PE) 0602144A (Ground Technology) / Project DG1 (Development of Obscurants)

The cited work is consistent with the Under Secretary of Defense Research and Engineering priority focus areas.

Work in this Project is performed by Chemical Biological Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Advanced Obscuration	-	2.825	2.832
Description: This effort matures and demonstrates the dissemination of new and advanced obscurants. ***FY 2024 Plans:*** Will further explore bi-spectral, millimeter wave, and multi-spectral obscurant materials; explore cost effective methods for material drying and packaging in order to further enhance performance against current capability for potential implementation into existing obscuration systems and examining the feasibility of use in future systems currently in development. ***FY 2025 Plans:*** Will explore packaging of higher performing millimeter wave obscurants to minimize corrosion issues associated with long term storage; continue to investigate novel bi-spectral obscuration materials, as well as working to increase the performance of existing materials through alternate drying methods; further investigate the integration and dissemination methodology of novel obscurant materials. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	-	2.825	2.832

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** DG2 / *Advanced Development of Obscurants*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) DI8 / *Environmental Security Resilience Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
DI8: *Environmental Security Resilience Adv Tech*	-	-	-	0.315	-	0.315	1.258	5.251	8.972	9.150	0.000	24.946
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2025 (FY25), funding in the amount of $0.315 million was realigned within PE 0603119A / Ground Advanced Technology from project DA2 / SAFR Alternatives for Readiness Advanced Tech to project DI8 / Environmental Security Resilience Adv Tech.

A. Mission Description and Budget Item Justification

This Project matures and demonstrates capabilities to inform Army Environmental Security Resilience decisions and support tools, providing new information on environmental factors to include emerging contaminates, biotechnology, extreme weather events, and natural stressors which impact Army operations or present supply-chain security concerns. Project efforts span the functional domains of strategic support area management, emergency preparedness, environmental protections, climate resilience, and analysis of future operational environment and environmental threats. This effort will demonstrate new models and decision support tools which provide actionable information that affect missions for operational planning and risk management by Army installation managers and Base Commanders around the world.

Work in this Project complements Program Element (PE) 0602144A (DI7) / Project (Environmental Security Resilience Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas, the Army Modernization Strategy, and the Army's Climate Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center Environmental Laboratory, Construction Research Engineering Laboratory, and the Cold Regions Research and Engineering Laboratory.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: PFAS Risk Reduction Advanced Development	-	-	0.315
Description: This effort will mature the per- and polyfluorinated substances (PFAS) risk-based decision framework tools to enabled rapid science-based-risk decisions for Army installation managers. This effort also shares information across the Army installation community through a PFAS communications hub.			
FY 2025 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** DI8 / *Environmental Security Resilience Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will mature the functional communication modular tool set and integrate and optimize the PFAS risk-based decision framework. Will exploit case studies to optimize the modular tool set final designs. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding was realigned within PE 0603119A / Ground Advanced Technology to project DI8 / Environmental Security Resilience Adv Tech to continue efforts initiated in project DA2 / SAFR Alternatives for Readiness Advanced Tech.			
Accomplishments/Planned Programs Subtotals	-	-	0.315

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603119A / *Ground Advanced Technology*	Project (Number/Name) DI9 / *Comprehensive Adapt Operational Energy Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
DI9: *Comprehensive Adapt Operational Energy Adv Tech*	-	-	-	0.601	-	0.601	0.751	0.952	0.902	0.810	0.000	4.016
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Comprehensive Adapt Operational Energy Adv Tech is a new start within the Ground Advanced Technology program in FY 2025.

A. Mission Description and Budget Item Justification

This Project will provide power control and distribution hardware (i.e., inverters and metering and monitoring equipment) that supports interoperability between the energy source program of record, such as Advanced Medium Mobile Power Source (AMMPS) and energy storage solutions at the tactical level. This project matures, demonstrates, and integrates a seamless bridge between low and medium voltage tactical generators (defined as 500kW and below), and improves decision tools to assist the Commander in choosing the optimal operational energy power storage type for their mission or force structure.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas.

Work in this Project is performed by the United States Army Engineer Research and Development Center, Construction Engineering Research Laboratory.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Operational Energy Life Cycle Management for Contingency Bases Demonstrations	-	-	0.601
Description: This effort demonstrates novel operational energy storage solutions to address distributed operations in multidomain operation and reduce fuel demand of Army contingency operations. ***FY 2025 Plans:*** Will assess inverters that can transfer power between power generation sources and energy storage solutions to reduce the overall fuel demand in Army contingency operations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects planned initiation of this effort.			
Accomplishments/Planned Programs Subtotals	-	-	0.601

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603119A / *Ground Advanced Technology*	**Project (Number/Name)** DI9 / *Comprehensive Adapt Operational Energy Adv Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A