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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603004A / <i>Weapons and Munitions Advanced Technology</i>
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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	-	240.862	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	240.862
232: <i>Advanced Lethality & Survivability Demo</i>	-	70.696	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	70.696
43A: <i>ADV WEAPONRY TECH DEMO (CA)</i>	-	139.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	139.000
L96: <i>High Energy Laser Technology Demo</i>	-	25.370	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	25.370
L97: <i>Smoke And Obscurants Advanced Technology</i>	-	5.796	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.796

Note

In Fiscal Year (FY) 2020 this Program Element (PE) is being eliminated, with continuity of effort realigned to the following PEs:
 ? 0603118A Soldier Lethality Advanced Technology
 ? 0603119A Ground Advanced Technology
 ? 0603462A Next Generation Combat Vehicle Advanced Technology
 ? 0603464A Long Range Precision Fires Advanced Technology
 ? 0603465A Future Vertical Lift Advanced Technology
 ? 0603466A High Energy Laser Tactical Vehicle Demonstrator Advanced Technology

A. Mission Description and Budget Item Justification

This PE matures weapons and munitions components/subsystems and demonstrates lethal weapons systems with potential to increase force application and force protection capabilities across the spectrum of operations. Project 232 focuses on affordable delivery of scalable effects for kinetic weapons and munitions including: artillery, mortars, medium caliber, tank fired, Soldier weapons and shoulder fired weapons. Project L96 matures and integrates critical high energy laser subsystems into mobile demonstrators to explore and validate system performance in relevant environments. Project L97 demonstrates performance of advanced obscurants and delivery of mechanisms and conducts forensic analysis of explosives and hazardous materials to enable detection.

Work in this PE is related to, and fully coordinated with, PE 0602120A (Sensors and Electronic Survivability), PE 0602307A (Advanced Weapons Technology), PE 0602618A (Ballistics Technology), PE 0602622A (Chemical, Smoke, and Equipment Defeating Technology), PE 0602624A (Weapons and Munitions Technology), PE 0602782A (Command, Control, Communications Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), and PE 0603313A (Missile and Rocket Advanced Technology).

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Beginning in FY20, work in this PE is related to and fully coordinated with PE 0603118A (Soldier Lethality Advanced Technology), PE 0603119A (Ground Advanced Technology), 0603462A (Next Generation Combat Vehicle Advanced Technology), 0603464A (Long Range Precision Fires Advanced Technology), 0603465A (Future Vertical Lift Advanced Technology), and PE 0603466A (Air and Missile Defense Advanced Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy.

The work in this PE is performed by the United States Army Futures Command (AFC) and the United States Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT).

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	241.581	0.000	0.000	-	0.000
Current President's Budget	240.862	0.000	0.000	-	0.000
Total Adjustments	-0.719	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.500	-			
• SBIR/STTR Transfer	-3.219	-			

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 43A: *ADV WEAPONRY TECH DEMO (CA)*

- Congressional Add: *Program Increase FY19 Appropriations Act*
- Congressional Add: *Program Increase FY19 Appropriations Act (CCDC)*
- Congressional Add: *Program increase - advanced development of asset protection technologies*
- Congressional Add: *Program increase - accelerate ERCA gun*
- Congressional Add: *Program increase - high energy laser*
- Congressional Add: *Program increase - long range precision fires*
- Congressional Add: *hypersonic capability - transfer from line 71*
- Congressional Add: *FY 2018 NDAA SEC 825 MDAP Cost Overrun (CCDC)*

	FY 2019	FY 2020
	14.000	-
	28.000	-
	5.000	-
	12.000	-
	20.000	-
	34.821	-
	25.000	-
	0.179	-

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603004A / <i>Weapons and Munitions Advanced Technology</i>
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<u>Congressional Add Details (\$ in Millions, and Includes General Reductions)</u>	FY 2019	FY 2020
Congressional Add Subtotals for Project: 43A	139.000	-
Congressional Add Totals for all Projects	139.000	-

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

Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603004A / <i>Weapons and Munitions Advanced Technology</i>	Project (Number/Name) 232 / <i>Advanced Lethality & Survivability Demo</i>
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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
<i>232: Advanced Lethality & Survivability Demo</i>	-	70.696	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	70.696

Note

In Fiscal Year (FY) 2020 this Project is being realigned to:
 PE 0603118A Soldier Lethality Advanced Technology
 * Project AY7 Small Arms Fire Control Advanced Technology
 PE 0603462A Next Generation Combat Vehicle Advanced Technology
 * Project BF5 Adv Lethality & Accuracy Sys for Med Cal Adv Tech
 * Project BG5 Extended Line of Sight (ELOS) Advanced Technology
 * Project BI1 Protection for Autonomous Systems Adv Tech
 * Project BK4 Next Gen Intelligent Fire Control(NG-IFC) Adv Tech
 * Project BK6 Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech
 PE 0603464A Long Range Precision Fires Advanced Technology
 * Project AE6 Strategic Long Range Cannon Advanced Technology
 * Project AG3 Extended Range Cannon Artillery (ERCA) Adv Tech
 * Project AG5 Extended Range Artillery Munition Suite Adv Tech
 * Project AG7 Energetic Materials and Adv Processing Adv Tech
 * Project BS3 Strategic Missile Advanced Technology
 PE 0603465A Future Vertical Lift Advanced Technology
 * Project AK7 Adv Rotorcraft Armaments Protection Sys Adv Tech

A. Mission Description and Budget Item Justification

This Project matures and demonstrates technologies for affordable precision munitions including advanced energetic materials and munitions, novel fuze designs, penetrators, and scalable effects.

Efforts in this Project support the Lethality and Ground Maneuver portfolios.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. FY20 realignments are due to financial restructuring in support of Army Modernization Priorities.

B. Accomplishments/Planned Programs (\$ in Millions)

Title: Cluster Munitions Replacement Acceleration	FY 2019	FY 2020	FY 2021
	7.748	-	-

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603004A / <i>Weapons and Munitions Advanced Technology</i>	Project (Number/Name) 232 / <i>Advanced Lethality & Survivability Demo</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020
Description: This effort matures and demonstrates ultra-high reliability fuzing, advanced kill mechanisms, and alternative dispensing technologies for 155mm artillery to provide increased battlefield lethality with reduced unexploded ordnance (UXO) compliant with the Department of Defense (DoD) cluster munitions policy.			
Title: Medium Caliber Weapon Systems		9.700	-
Description: This effort matures and demonstrates advanced medium caliber ammunition, weapon, fire control, and Ammunition Handling Systems (AHS) optimized for remote operation. This effort demonstrates cannon-super high elevation engagement, high performance stabilization, remote ammunition loading, weapon safety and reliability, improved lethality, accuracy, ability to fire a suite of ammunition from non-lethal to lethal, and escalation of force capability in one system.			-
Title: Scale-up of Energetic Materials		1.937	-
Description: This effort matures and demonstrates the performance and insensitivity of energetic materials ranging from 25mm medium caliber (direct fire) through 155mm large caliber (indirect fire) weapons.			-
Title: Active Protection Armament Technologies		4.358	-
Description: This effort supports the Army's Active Protection System (APS) program to mature and demonstrate APS technologies to reduce vehicle weight while reducing reliance on armor through the use of other means such as sensing, warning, hostile fire detection, and active countermeasures to achieve increased protection against current and emerging threats.			-
Title: Long Range Gun Technology		4.628	-
Description: This effort matures and demonstrates extended range artillery weapon system and projectile technologies that increase the range by 25% without an increase in platform weight.			-
Title: Counter-Unmanned Aviation System (C-UAS) Technology		3.622	-
Description: This effort matures and demonstrates C-UAS technologies designed to encompass the entire kill chain including detection, tracking, classification, and kinetic defeat of UAS for point defense and mobile applications.			-
Title: Accelerated Extended Range Munition Suite		22.152	-
Description: This effort matures and demonstrates extended range artillery technologies including rocket and base bleed propulsion, hybrid lifting surfaces and guidance technologies which increase range and accuracy.			-
Title: Fuze and Power Technology for Munitions		2.360	-

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603004A / <i>Weapons and Munitions Advanced Technology</i>	Project (Number/Name) 232 / <i>Advanced Lethality & Survivability Demo</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Description: This effort matures and demonstrates innovative fuze and power technologies for enhanced environment and target sensing/classification, warhead initiation schemes, and advanced fuze setting. These technologies will provide enhanced lethality combined effects on targets and advanced initiation schemes for the next generation munitions.				
Title: Extended Range Armament and Fire Control Integration		3.447	-	-
Description: This effort matures and demonstrates extended range Armament technologies including light weight Cannon and Mount structures, high efficiency recoil cylinders, common lower power fire control hardware, improved fire control software, and improved sensor to shooter communications which will increase range and accuracy.				
Title: Aviation Armament System Technologies		2.433	-	-
Description: This effort matures and demonstrates armament solutions adaptable to current aviation and future vertical lift applications in small caliber, medium caliber, counter measure technologies with a focus on light lethal aerodynamic systems.				
Title: Extended Line of Site Munition (ELOS)		5.811	-	-
Description: This effort demonstrates a 120mm Tank fired ELOS Munition that counters the growing Anti-Tank Guided Missile (ATGM) threat at extended line of sight ranges beyond current capability.				
Title: AI Test Bed		2.500	-	-
Accomplishments/Planned Programs Subtotals		70.696	-	-
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
N/A				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603004A / Weapons and Munitions Advanced Technology				Project (Number/Name) 43A / ADV WEAPONRY TECH DEMO (CA)			
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
43A: ADV WEAPONRY TECH DEMO (CA)	-	139.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	139.000

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Advanced Weaponry Technology development.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020
Congressional Add: Program Increase FY19 Appropriations Act	14.000	-
FY 2019 Accomplishments: Program Increase FY19 Appropriations Act		
Congressional Add: Program Increase FY19 Appropriations Act (CCDC)	28.000	-
FY 2019 Accomplishments: Program Increase FY19 Appropriations Act (CCDC)		
Congressional Add: Program increase - advanced development of asset protection technologies	5.000	-
FY 2019 Accomplishments: Program increase - advanced development of asset protection technologies		
Congressional Add: Program increase - accelerate ERCA gun	12.000	-
FY 2019 Accomplishments: Program increase - accelerate ERCA gun		
Congressional Add: Program increase - high energy laser	20.000	-
FY 2019 Accomplishments: Program increase - high energy laser		
Congressional Add: Program increase - long range precision fires	34.821	-
FY 2019 Accomplishments: Program increase - long range precision fires		
Congressional Add: hypersonic capability - transfer from line 71	25.000	-
FY 2019 Accomplishments: hypersonic capability - transfer from line 71		
Congressional Add: FY 2018 NDAA SEC 825 MDAP Cost Overrun (CCDC)	0.179	-
FY 2019 Accomplishments: FY 2018 NDAA SEC 825 MDAP Cost Overrun (CCDC)		
Congressional Adds Subtotals	139.000	-

C. Other Program Funding Summary (\$ in Millions)

N/A

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603004A / <i>Weapons and Munitions Advanced Technology</i>	Project (Number/Name) 43A / <i>ADV WEAPONRY TECH DEMO (CA)</i>

C. Other Program Funding Summary (\$ in Millions)

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603004A / Weapons and Munitions Advanced Technology				Project (Number/Name) L96 / High Energy Laser Technology Demo			
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
L96: High Energy Laser Technology Demo	-	25.370	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	25.370

Note

In Fiscal Year (FY) 2020 this Project is being realigned to:
 Program Element (PE) 0603466A Air and Missile Defense Advanced Technology
 * Project AD1 High Energy Laser Tactical Vehicle Demo Adv Tech

A. Mission Description and Budget Item Justification

This Project matures and demonstrates advanced technologies for future High Energy Laser (HEL) weapons technology. The major effort under this Project is the phased approach for mobile high power solid state laser (SSL) technology demonstrations that are traceable to the form, fit, and function requirements for a HEL weapon. SSL technology has demonstrated the potential to engage and defeat rockets, artillery and mortars (RAM), unmanned aerial vehicles (UAVs), cruise missiles, sensors, and optics at tactically relevant ranges. HELs are expected to complement conventional offensive and defensive weapons at a lower cost-per-shot than current systems and without the need to strategically, operationally, or tactically stockpile ordnance. This effort utilizes a modular building block approach with open systems architecture to ensure growth, interoperability, and opportunity for technology insertions for maturation of laser, beam control, sensor/radar, integration of power and thermal management subsystems, as well as Battle Management Command, Control, and Computers (BMC3).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. FY20 realignments are due to financial restructuring in support of Army Modernization Priorities.

Work is performed by the United States Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Laser System Ruggedization	18.494	-	-
Description: This effort ruggedizes laser systems for integration on Army platforms. Ruggedization includes modifications of the laser system to withstand vibration, temperature, and contamination environments expected on various Army platforms, while ensuring platform volume, weight, and interface specifications are met.			
Title: High Energy Laser Systems Integration and Mobile Demonstrations	6.876	-	-
Description: This effort integrates a 50 kW-class laser into the existing mobile laser demonstrator platform that includes the ruggedized Beam Control System (BCS) built under the HEL Technical Demonstration effort and other required subsystems			

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Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603004A / <i>Weapons and Munitions Advanced Technology</i>	Project (Number/Name) L96 / <i>High Energy Laser Technology Demo</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
to demonstrate weapon system performance. The goal is to demonstrate and evaluate performance of a complete mobile high energy laser system in a relevant environment.			
Accomplishments/Planned Programs Subtotals	25.370	-	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603004A / Weapons and Munitions Advanced Technology			Project (Number/Name) L97 / Smoke And Obscurants Advanced Technology				
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
L97: Smoke And Obscurants Advanced Technology	-	5.796	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.796

Note

In Fiscal Year (FY) 2020 this Project is being realigned to:
 Program Element (PE) 0603119A Ground Advanced Technology, Projects:
 * BL3 Explosives Forensics Advanced Technology
 PE 0603462A Next Generation Combat Vehicle Advanced Technology, Projects:
 * BG7 Ground Systems Active Defense (GSAD) Advanced Tech
 * BG9 Obscuration Advanced Technology

A. Mission Description and Budget Item Justification

The Project matures and demonstrates obscurant technologies with potential to enhance personnel/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. This Project also matures and demonstrates improved detection of explosives and hazardous materials by Soldiers and Small Units.

Work in this Project is related to, and fully coordinated with, PE 0602622A (Chemical, Smoke and Equipment Defeating Technology) / Project 552 (Smoke/Novel Effect Mun) and PE 0603606A (Landmine Warfare and Barrier Advanced Technology / Project 608 (Countermines & Bar Dev).

This Project sustains Army Science and Technology efforts supporting the Ground Maneuver portfolio.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. FY20 realignments are due to financial restructuring in support of Army Modernization Priorities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2019	FY 2020	FY 2021
Title: Obscurant Enabling Technologies	1.802	-	-
Description: This effort demonstrates the dissemination of new and advanced obscurants. This effort will support Modular Active Protection System (MAPS) in PE 0603005A (Combat vehicle and Automotive Advanced Technology) / Project 221 (Combat Veh Survivability).			
Title: Forensic Analysis of Explosives	2.065	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Description: This effort demonstrates improved point and stand-off detection of explosives and homemade explosive (HME) precursors.			
Title: Detection Mechanisms for Contaminants	1.923	-	-
Description: This effort demonstrates improved point and standoff detection of a wide range of hazardous materials.			
Title: FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.006	-	-
Description: FY 2018 NDAA SEC 825 MDAP Cost Overrun			
Accomplishments/Planned Programs Subtotals	5.796	-	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A