Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Army											Date: February 2016	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603004A *I Weapons and Munitions Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**Cost To Complete**	**Total Cost**
Total Program Element	-	72.176	82.663	68.714	-	68.714	76.822	72.837	75.512	69.520	-	-
232: *Advanced Lethality & Survivability Demo*	-	38.685	40.797	46.051	-	46.051	47.741	41.586	40.244	39.787	-	-
43A: *ADV WEAPONRY TECH DEMO*	-	15.000	25.000	0.000	-	0.000	0.000	0.000	0.000	0.000	-	-
L96: *High Energy Laser Technology Demo*	-	14.908	12.526	17.728	-	17.728	24.075	26.226	30.143	24.505	-	-
L97: *Smoke And Obscurants Advanced Technology*	-	3.583	4.340	4.935	-	4.935	5.006	5.025	5.125	5.228	-	-

A. Mission Description and Budget Item Justification

This Program Element (PE) matures weapons and munitions components/subsystems and demonstrates lethal and non-lethal weapons and munitions with potential to increase force application and force protection capabilities across the spectrum of operations. Project 232 focuses on affordable delivery of scalable (lethal to non-lethal) effects for 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 a mobile demonstrator 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 0602772A (Advanced Tactical Computer Science and Sensor Technology), PE 0602782A (Command, Control, Communications Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603008A (Electronic Warfare Advanced Technology), and PE 0603313A (Missile and Rocket Advanced Technology).

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

Work in this PE is performed by the Armament Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ; Edgewood Chemical Biological Center (ECBC), Edgewood, MD; and the Army Space and Missile Defense Command (SMDC), Huntsville, AL.

Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Army	Date: February 2016
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603004A *I Weapons and Munitions Advanced Technology*

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	72.908	57.663	63.457	-	63.457
Current President's Budget	72.176	82.663	68.714	-	68.714
Total Adjustments	-0.732	25.000	5.257	-	5.257
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	25.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.948	-			
• SBIR/STTR Transfer	-1.680	-			
• Adjustments to Budget Years	-	-	5.257	-	5.257

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2015	FY 2016
Project: 43A: *ADV WEAPONRY TECH DEMO*		
Congressional Add: *Program Increase*	15.000	25.000
Congressional Add Subtotals for Project: 43A	15.000	25.000
Congressional Add Totals for all Projects	15.000	25.000

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army			Date: February 2016
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603004A / *Weapons and Munitions Advanced Technology*	Project (Number/Name) 232 / *Advanced Lethality & Survivability Demo*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
232: *Advanced Lethality & Survivability Demo*	-	38.685	40.797	46.051	-	46.051	47.741	41.586	40.244	39.787	-	-

A. Mission Description and Budget Item Justification

This project matures and demonstrates technologies for affordable precision lethal and non-lethal weapons and munitions. Technologies include advanced energetic materials, insensitive munitions, novel fuze designs, penetrators, scalable effects and millimeter wave sources for high power microwave (HPM) systems.

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

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

Work in this project is performed by the Armament Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Ground Based Networked Munitions Technologies	0.992	1.004	1.300
Description: This effort matures and demonstrates technology for improved capability remotely delivered area denial munition systems to include: networked munition architecture, low hazard effects, delivery mechanisms, and non-lethal response to tampering. ***FY 2015 Accomplishments:*** Integrated and demonstrated technologies for multi-purpose networked munitions. ***FY 2016 Plans:*** Develop area denial munition technologies including networked munition level architecture and advanced methods for precision delivery/location of remote effects. ***FY 2017 Plans:*** Will mature the Networked Munition modular architecture for use in future Programs of Record; Demonstrate technologies for non-kinetic energy vehicle stopping.			
Title: Extended Area Protection and Survivability (EAPS)	2.940	-	-
Description: This effort demonstrates the use of command-guided medium caliber projectiles for the interception and destruction of incoming rockets, artillery, and mortar rounds (RAM) and unmanned aerial systems (UAS).			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
FY 2015 Accomplishments: Optimized and demonstrated an integrated Counter Unmanned Aerial Systems (C-UAS) capability, comprised of algorithms, fire control and command guided interceptor munitions.			
Title: Cluster Munitions Replacement Acceleration ***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. ***FY 2015 Accomplishments:*** Matured the design and demonstrated performance against the expanded target set that now includes tracked and light wheeled tactical vehicles; exploited emerging breakthroughs in warhead technologies that enabled defeat of the expanded target sets at a reduced cost (e.g. number of rounds fired to service a target). ***FY 2016 Plans:*** Continue maturation of a novel cluster munition policy compliant warhead for 155mm artillery; conduct arena testing of multi-explosive formed penetration optimized for effects against armored targets integrated into a 155mm artillery projectile compliant with DoD cluster munition policy; conduct static and ballistic testing on an integrated projectile, culminating in a Technical Readiness Level (TRL) 6 demonstration. ***FY 2017 Plans:*** Will validate the systems beginning to end capability as well as the system's ability to improve effectiveness against the desired target sets; mature and demonstrate various component designs in a system level solution. The effort will continue to improve and mature a variety of integrated unitary and submunition system concepts to mitigate the gap that will emerge with the loss of cluster munitions. Concepts such as a unitary projectile geared towards medium armor targets, a full bore submunition with a highly reliable triple function fuze, a concept that increases the size and fuze volume of the DPICM bomblet and incorporates high reliability fuzing while maintaining the traditional lethal mechanisms of DPICM. In Fiscal Year (FY) 2017 the efforts will optimize the concept of bomblet/system design and component space allocation to accommodate system level development and demonstrating concept performance through modeling and simulation. Efforts will mature system level designs of unitary solutions and improve initial system level performance. Efforts will continue to mature designs and exploit alternate technologies to mitigate risk; Develop evaluation criteria to assess concept performance; Integrate component technologies into system level solution that are effective against target sets.	2.915	3.000	8.500
Title: Medium Caliber Weapon Systems	9.990	9.967	16.000

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Description: This effort matures and demonstrates advanced medium caliber ammunition, weapon, fire control, and ammunition handling systems 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. ***FY 2015 Accomplishments:*** Optimized technologies from Weapon, Fire Control and Turret functional areas together in preparation of demonstrating a system level platform integration with an advanced medium caliber weapon system within a Bradley Fighting Vehicle (BFV) variant. In support of this effort, finalized and optimized a prototype turret and drive system to support the XM813 30mm weapon system; optimized and matured the advanced sensors (down range wind sensor, dynamic metrology sensor and improved laser range finder) and the scenario based fire control system supporting the XM813 30mm weapon system, 30mm armor piercing (AP) munition and the Mk310 30mm programmable air bursting munitions (PABM); performed the integration of these technologies within the BFV and demonstrated improved accuracy and lethality performance at a system level. Additionally, finalized 50mm fuze improvements and performed a fuze shoot off and demonstration to down select and optimize the burst point accuracy of the 50mm PABM munition. ***FY 2016 Plans:*** Continue to mature and optimize weapon, ammunition, fire control, and turret technologies for 50mm cannon; refine the ammunition fuzing approach to improve accuracy and lethality; analyze data collected from integration, test and demonstration to apply to system level improvements; upgrade fire control to meet system level requirements and design turret for integration into a prototype platform. ***FY 2017 Plans:*** Will validate PABM fuze technology and warhead lethality data, iterating and improving as necessary; using a commercially developed barrel, demonstrate PABM and AP effectiveness against personnel and materiel targets; design and fabricate 50mm weapon and ammunition handling system (AHS) prototypes; exploit advances in advanced Fire Control hardware to improve system performance; mature Fire Control software.			
Title: Advanced Power and Energy Management for Munitions ***Description:*** This effort demonstrates the technology options available to provide the next generation of gun fired smart munitions with advanced fuzing and power components for improved performance. ***FY 2015 Accomplishments:***	0.585	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Optimized next generation proximity sensor (NGPS) sub-system to meet improved performance requirements; demonstrated and validated NGPS design in an artillery platform to achieve a TRL 6.			
Title: Scale-up of Energetic Materials ***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. ***FY 2015 Accomplishments:*** Performed appropriate test series on mature propellant and explosive formulations to facilitate certification at the Energetic Material Qualification Board (EMQB) level and enabled transition of new materials to munitions qualification programs. ***FY 2016 Plans:*** Begin the transition of insensitive energetic materials of interest to the Army; and down-select and evaluate energetic materials to be scaled up to production levels to verify they meet the Army needs and can be produced in large quantity.	2.924	2.000	-
Title: Active Protection Armament Technologies ***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. This effort is done in coordination with efforts in Program Element (PE) 0602601A, PE 0602618A, PE 0603004A, PE 0603005A, PE 0603270A, and PE 0603313A. ***FY 2015 Accomplishments:*** Matured and integrated hard kill related technologies such as fire control, target detection device and hard kill countermeasures into the Army's APS common architecture. ***FY 2016 Plans:*** Develop hard-kill countermeasure system requirements to ensure proper interface with the Modular APS; continue to mature and merge key hard-kill technologies including fire control, launcher, munition, and warhead for seamless integration with the Army's MAPS controller. ***FY 2017 Plans:*** Will develop and bench test critical mature subcomponents as well as use of existing performance and simulation models to validate Hard Kill modularity as a capability. Will determine subsystem integration requirements and optimize interface	2.958	5.967	6.250

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
specifications to support a Modular APS Framework (MAF) compliant Hard Kill component. Will mature modularity of subsystem components.			
Title: Precision Non-Line-of-Sight (NLOS) Munition for Light Forces ***Description:*** This effort will provide a precision technology capability for an 81mm mortar cartridge for light forces for base defense. ***FY 2015 Accomplishments:*** Matured components, built hardware and verified 81mm precision design via a live system test; verified GPS and fuze setter technology and candidate designs with tests. ***FY 2016 Plans:*** Fabricate and demonstrate 81mm precision mortar design through a series of inert system flight tests culminating in a capability demonstration at the end of FY16.	1.424	1.004	-
Title: Extended Range/Guided 40mm Munition ***Description:*** This effort develops a 40mm guided, low cost, extended range projectile for use in the M320 launcher. This projectile will be capable of defeating beyond line-of-sight targets. ***FY 2015 Accomplishments:*** Matured, integrated and demonstrated component technologies in an extended range guided 40mm projectile to 600 meters (threshold)/1000 meters (objective); demonstrated improved probability of hit at an increased range; provided a low cost integrated guidance navigation and control system with optimized airframe, canards, tail fin, and propulsion system; optimized fuze and warhead design for enhanced lethality; demonstrated the ability of the projectile to guide to hit targets at ranges between 600 to 1000 meters.	2.849	-	-
Title: Automated Direct/Indirect Fire Mortar (ADIM) ***Description:*** This effort develops a line-of-sight/non-line-of-sight remotely operated mortar system for use in base protection and mobile fire support. ***FY 2015 Accomplishments:*** Adapted the system to be compatible with the 81mm precision mortar cartridge; prepared for an integrated demonstration.	1.874	-	-
Title: Enhanced Sniper Technologies	1.424	3.011	-

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Description: This effort investigates advanced projectile designs such as long rod penetrator technologies that will provide snipers with the capability for increased range effectiveness (up to 1500m, possibly greater), hit probability, and armor penetration, for use in man-portable sniper weapons. ***FY 2015 Accomplishments:*** Validated the technology matured through this program by demonstrating improved sniper cartridges fired in common calibers weapons that increase a sniper's probability of hit in non-ideal/combat relevant conditions at extended ranges. ***FY 2016 Plans:*** Optimize demonstrated advanced sniper ammunition concepts through modeling and simulation and design veirfication; and demonstrate selected fully integrated ammunition-weapon designs in relevant operational environments			
Title: Long Range Gun Technology ***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. ***FY 2015 Accomplishments:*** Matured component technologies associated with longer range artillery capabilities to include weapon system components like cannon tube, breech and mount. ***FY 2016 Plans:*** Continue to mature designs of component technologies associated with longer range artillery capabilities including cannon tube, breech and mount; conduct initial component verification; and conduct prototype testing of weapon sub-systems. ***FY 2017 Plans:*** Will demonstrate and optimize initial long range artillery subsystems components and prototypes including cannon tube, breech and mount; and mature component designs of secondary weapon subsystems such as scavenge systems, diagnostics, and muzzle brakes.	2.034	7.015	1.686
Title: Soldier Fired Advanced Effect Air Burst Munition ***Description:*** This effort demonstrates technologies for improved lethality of current air bursting munitions which address emerging requirements from the warfighter. ***FY 2015 Accomplishments:***	1.700	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Matured technologies for neutralization of targets in defilade; matured and demonstrated advanced explosives/fragmentation warhead designs that increased lethal zone for air burst munitions.			
Title: Affordable Precision Technologies ***Description:*** This effort integrates complementing navigation sensors, actuators and subsystems in order to demonstrate precision delivery capability on an indirect fire munition system in a global positioning system (GPS) denied environment. ***FY 2015 Accomplishments:*** Integrated and optimized critical guidance subsystems; demonstrated airframe and actuator performance through flight testing in order to verify the maneuverability of the projectile. ***FY 2016 Plans:*** Demonstrate image navigation guidance technology with algorithms and associated optics integrated in a projectile through a series of captive flight tests; demonstrate guidance and control system in a dynamic test to verify the ability to maneuver in flight. ***FY 2017 Plans:*** Will fully integrate the optics, image processing, navigation and control components into a guidance system for testing on candidate airframes; demonstrate baseline performance initially in day-time / favorable weather; demonstrate full system survivability in extreme environmental conditions.	1.998	2.500	2.000
Title: Guided Enhanced Fragmentation Mortar Munition ***Description:*** This effort will develop and demonstrate a 120mm precision guided mortar with improved capabilities with respect to the currently fielded 120mm precision guided mortar. ***FY 2015 Accomplishments:*** Built and tested fully integrated 120mm precision guided mortar systems to verify designs and demonstrated functionality at nominal and environmental extreme conditions.	2.078	-	-
Title: Counter-Unmanned Aviation System (C-UAS) Technology ***Description:*** This effort matures and demonstrates modular C-UAS technologies designed to encompass the entire kill chain including detection, tracking, classification, and defeat of UAS for point defense and mobile applications. ***FY 2016 Plans:***	-	2.000	2.700

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Mature and integrate technologies for UAS tracking and defeat; evaluate and select weapon systems and munitions for defeat of UAS and integrate into current system of systems for mobile and area defense; integrate precision fire control mechanisms and demonstrate the system of systems defeat of UASs; evaluate results of demonstrated UAS defeat mechanisms. ***FY 2017 Plans:*** Will continue the maturation and optimization of technologies for UAS tracking and defeating to include the integration of precision fire control mechanisms and weapons systems. Will validate the technologies at the subsystem level and evaluate results of the UAS defeat mechanisms.			
Title: Extended Range Munition Integration ***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. ***FY 2016 Plans:*** Mature and integrate projectile technologies for next generation extended range rocket-assisted projectiles including integrated munition designs involving novel rocket motor formulations, advanced flight controls, and precision guidance components that can survive launch conditons in an extended range cannon environment. ***FY 2017 Plans:*** Will demonstrate designs of extended range rocket assisted projectiles fires with currently fielded weapon systems; optimize next generation rocket assisted projectile designs to increase lethality and range when fired with extended range cannon systems; optimize projectiles for use with advanced navigation, flight control, and guidance.	-	3.329	2.800
Title: Fuze and Power Technology for Munitions ***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. ***FY 2017 Plans:*** Will mature and demonstrate airburst fuze technology systems for increased accuracy in multi-mode medium caliber rounds; demonstrate low-cost, in-line safety and arming systems for advanced warhead initiation schemes; improve multi-point initiation systems applicable to Insensitive Munitions; optimize next generation fuze setting methodologies to more efficiently transfer and store power and data to smart indirect fire projectiles. These technologies will continue to support the Joint Munitions Program Technical Coordinating Group (TCG-5 and TCG-10) and the Joint Fuze Technology Program (JFTP).	-	-	1.800
Title: Advanced Small Arms Ballistic System	-	-	1.915

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Description: This effort matures and demonstrates advanced small arms ballistic calculations output from advanced sensor input and optimized architecture for rifles integrated with optic and precision-optical wind sensing. ***FY 2017 Plans:*** Will mature and demonstrate optimized architecture for the precision-optical wind sensing; mature technologies to improve and increase probability of hit, exploiting advanced sensor data including downrange wind sensing, to provide ballistic corrections supporting PM Individual-Weapons platforms.			
Title: Enhanced Tactical Multi-Purpose (ETMP) Hand Grenade ***Description:*** This effort develops a multi-purpose selectable lethal hand grenade that produces either fragmentation or blast overpressure effects. ***FY 2017 Plans:*** Will optimize and refine the design of the subsystems (mode selector, fuze, warhead) based on the results of testing completed to date; integrate all the components into a system and conduct laboratory assessments leading up to a TRL 5 demonstration.	-	-	1.100
Accomplishments/Planned Programs Subtotals	38.685	40.797	46.051

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army			Date: February 2016
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*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
43A: *ADV WEAPONRY TECH DEMO*	-	15.000	25.000	0.000	-	0.000	0.000	0.000	0.000	0.000	-	-

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Advanced Weaponry Technology development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016
Congressional Add: Program Increase	15.000	25.000
FY 2015 Accomplishments: Advanced weaponry technology demonstrations		
FY 2016 Plans: Advanced weaponry technology demonstrations		
Congressional Adds Subtotals	15.000	25.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army			Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
L96: *High Energy Laser Technology Demo*	-	14.908	12.526	17.728	-	17.728	24.075	26.226	30.143	24.505	-	-

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. At entry level weapon power of around 10 kW, SSL technology has the potential to engage and defeat small caliber mortars, unmanned aerial vehicles (UAVs), surface mines, sensors, and optics. At full weapon system power levels of around 100 kW, SSL technology has the potential to engage and defeat rockets, artillery and mortars (RAM), 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 Assistant Secretary of Defense for Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work is performed by the Army Space and Missile Defense Command (SMDC)/Army Forces Strategic Command, Technical Center, Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Laser System Ruggedization	5.890	5.059	4.216
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. The laser system consists of laser devices, such as the laboratory laser devices developed under Program Element (PE) 0602307A, Project 042, and the prime power (PE 0603005A, Project 441), command and control and thermal management subsystems required for the laser device operation.			
FY 2015 Accomplishments: Continued additional ruggedization of a 50kW class laser device for integration on the HEL Mobile Demonstration (MD) platform; continued ruggedization of thermal management technology that can cool the 50 kW laser device; and initiated power generation function ruggedization for recharging the power storage modules.			
FY 2016 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Continue ruggedization of the thermal management subsystem and power management subsystem; ruggedize available power storage hardware received from the U.S. Army Tank-Automotive Research Development and Engineering Center (TARDEC) in preparation for integration; continue ruggedization of 50 kW class solid state laser subsystem components; and begin ruggedization of the BMC3 subsystem. ***FY 2017 Plans:*** Will complete the ruggedization and preparation of platform to accept the 50 kW-class laser from Project 042; develop and integrate prime power and thermal management subsystems to support the 50 kW risk reduction testing in FY 2018 and optimize the command and control subsystem to manage the new laser, power, and thermal management subsystems.			
Title: High Energy Laser Mobile Demonstrations (HEL MD) ***Description:*** This effort integrates a commercial-off-the-shelf (COTS) 10kW laser subsystem and demonstrated that performance. The 50 kW-class laser from Project 042 will be integrated into the existing mobile laser demonstrator platform that includes the ruggedized beam control system (BCS) built under the High Energy Laser Technical Demonstration effort and other required subsystems 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. ***FY 2015 Accomplishments:*** Began subsystem demonstration and performance validation for the ruggedized thermal management technology that cools the 50 kW laser device; began subsystem demonstration and performance validation for the ruggedized battle management function that provides controls for the 50kW laser and other subsystems; and began planning for the integrated 50kW class demonstration, to include objective definition, demonstration reference missions, and long-lead purchases. ***FY 2016 Plans:*** Continue coordination activities for 50kW class laser demonstration and data collection events with range, the Laser Clearing House, and the Federal Aviation Authority (FAA) organizations; begin modifications of interfaces and integration of thermal management and power management subsystems; begin performance validation of integrated thermal management and power management subsystems for the 50 kW class demonstration; and begin fabrication of interfaces and integration of laser subsystem components. ***FY 2017 Plans:*** Will begin integration of the ruggedized 50 kW class laser subsystems into an Army platform and perform functional verifications to validate system operation; coordinate with the national test range(s) and procure targets for a system risk reduction	9.018	7.467	13.512

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
demonstration; demonstrate the 50 kW class configuration in the laboratory to verify the system meets the performance metrics prior to beginning integration on the Army platform.			
Accomplishments/Planned Programs Subtotals	14.908	12.526	17.728

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army			Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
L97: *Smoke And Obscurants Advanced Technology*	-	3.583	4.340	4.935	-	4.935	5.006	5.025	5.125	5.228	-	-

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, Program Element (PE) 0602622A (Chemical, Smoke and Equipment Defeating Technology) and PE 0603606A, Project 608 (Countermine & Barrier Development).

This project sustains Army science and technology efforts supporting the Ground Maneuver portfolio.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed and managed by the Army Research, Development, and Engineering Command (RDECOM), Edgewood Chemical Biological Center (ECBC), Edgewood, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Obscurant Enabling Technologies	0.697	0.836	0.851
Description: This effort demonstrates the dissemination of new and advanced obscurants. ***FY 2015 Accomplishments:*** . Conducted initial dissemination studies on artillery/mortar delivered low hazard visual obscurant. Demonstrated low hazard visual smoke grenade. ***FY 2016 Plans:*** Continue dissemination studies of artillery/mortar delivered low hazard visual obscurant. ***FY 2017 Plans:*** Will develop techniques for dissemination of new microwave obscurants and explore new microwave obscurant applications.			
Title: Forensic Analysis of Explosives	1.313	1.577	2.096

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Description: This effort demonstrates improved point and stand-off detection of explosives and home made explosive (HME) precursors. ***FY 2015 Accomplishments:*** Integrated and demonstrated Chemical Fingerprint Identification System (CFIS) device for unambiguous biometric identification of an individual linking explosive residue identified and found in latent fingerprints using Raman Chemical Imaging. ***FY 2016 Plans:*** Optimize and mature the CFIS device for unambiguous biometric identification of an individual linking explosive residue identified and found in latent fingerprints using Raman Chemical Imaging. ***FY 2017 Plans:*** Will evaluate prototype CFIS standalone instruments to ensure they are fully integrated and will meet the fingerprinting and chemical identification requirements for the Common Analytical Lab System (CALS). Additionally will advance Ultraviolet-Visible Near Infrared (UV-Vis-NIR) multispectral imaging for improved discrimination of target materials and substrates.			
Title: Detection Mechanisms for Contaminants ***Description:*** This effort demonstrates improved point and standoff detection of a wide range of hazardous materials. ***FY 2015 Accomplishments:*** Demonstrated unambiguous detection of explosives and chemical agents in a unified and integrated system based on ion mobility spectrometry. ***FY 2016 Plans:*** Expand number of explosive materials detected in the Chemical Explosives Detector (CED) variant of the Joint Chemical Detector (JCD) while retaining Chemical Warfare Agent (CWA) and Toxic Industrial Chemical (TIC) detection capabilities; integrate software and algorithms supporting the detection of explosive materials in the CED; optimize and mature the inlet system for particulate and vapor detection, as well as integrated on-board vapor generators (OVGs) for dopant and calibrant delivery. ***FY 2017 Plans:*** Will identify up to four on-board calibrants in order to improve the real time detection of the CED by an order of magnitude. Will determine mobility values of the calibrants and target molecules used as detection parameters for algorithms in ion mobility spectra. Will establish dependence of detection parameters on water vapor and make a final recommendation to JPM-CA of most stable calibrant. Will Implement new detection parameters in software. Will demonstrate improved ionization of explosives	1.573	1.927	1.988

Exhibit R-2A, RDT&E Project Justification: PB 2017 Army		Date: February 2016
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
using up to four chlorine based dopants. Will optimize and mature CED probe design to enhance the detection performance on explosives and other low volatility threats.			
Accomplishments/Planned Programs Subtotals	3.583	4.340	4.935

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A