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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020	
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					PE 0604802A / Weapons and Munitions - Eng Dev							
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	-	173.713	186.323	265.811	-	265.811	252.058	171.876	111.119	91.056	0.000	1,251.956
613: MORTAR SYSTEMS	-	0.000	5.792	1.409	-	1.409	0.000	0.000	0.000	7.993	0.000	15.194
BQ3: 155mm Artillery Propulsion XM654*	-	0.000	0.000	0.000	-	0.000	34.887	25.883	14.815	0.000	0.000	75.585
BY1: Next Generation Combat Vehicle Ammunition	-	0.000	0.000	23.017	-	23.017	14.986	8.792	5.995	0.000	0.000	52.790
EC4: Non-Standard Simulator Munitions	-	2.899	2.644	2.236	-	2.236	2.143	2.133	2.121	0.398	0.000	14.574
ED7: Advanced Multipurpose (AMP) Cartridge	-	20.814	14.100	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	34.914
EL9: Ammunitions Logistics Prototyping	-	1.684	2.329	1.701	-	1.701	0.704	0.999	1.019	1.039	0.000	9.475
EP2: Shoulder-Launched Munitions	-	0.000	4.100	10.390	-	10.390	0.000	0.000	0.000	0.000	0.000	14.490
EP3: Reduced Range Ammunition - Small Caliber	-	4.432	8.376	15.377	-	15.377	14.873	5.095	0.000	0.000	0.000	48.153
EP4: One-Way Luminescence for Small Caliber Ammo	-	5.855	8.547	13.977	-	13.977	6.981	7.393	2.998	0.000	0.000	45.751
EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	-	20.247	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.247
EP7: Aviation Airborne Expendable Countermeasures	-	0.000	4.920	4.476	-	4.476	8.241	0.000	0.000	0.000	0.000	17.637
EU4: 40mm HV Improved High Explosive Dual Purpose	-	6.937	13.055	8.351	-	8.351	2.311	0.000	0.000	0.000	0.000	30.654
EU5: .50 Caliber All-Purpose Tactical cartridge (APTC)	-	0.000	0.000	8.491	-	8.491	9.390	0.000	0.000	11.989	0.000	29.870
EU6: 155mm HE Rocket Assist Project Extended Range	-	37.565	18.943	31.236	-	31.236	2.997	2.997	0.000	0.000	0.000	93.738

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<i>EU7: Enhanced Lethality Cannon Munitions</i>	-	10.915	7.908	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	18.823
<i>EU8: Improved Multi-Option Fuze</i>	-	7.615	10.000	7.992	-	7.992	4.995	0.000	0.000	0.000	0.000	0.000	30.602
<i>EW1: 40mm Low Velocity Ammunition</i>	-	8.467	14.032	22.479	-	22.479	5.958	1.998	0.000	0.000	0.000	0.000	52.934
<i>FA6: 30mm Lethality</i>	-	19.128	22.897	20.091	-	20.091	9.788	5.995	2.997	0.000	0.000	0.000	80.896
<i>FJ4: Cannon-Delivered Area Effects Munitions (C-DAEM)</i>	-	0.000	0.000	27.600	-	27.600	82.685	72.655	64.440	54.453	0.000	0.000	301.833
<i>FL4: Small Caliber Ammo for Next Gen Squad Weapons</i>	-	0.000	18.180	30.600	-	30.600	28.723	24.976	11.739	11.858	0.000	0.000	126.076
<i>S36: Precision Guidance Kit</i>	-	27.155	30.500	33.365	-	33.365	22.396	12.960	4.995	3.326	0.000	0.000	134.697
<i>XT2: 40mm Door Breach</i>	-	0.000	0.000	3.023	-	3.023	0.000	0.000	0.000	0.000	0.000	0.000	3.023

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2021

Note

Project BY1 Next Generation Combat Vehicle Ammunition transitions from Budget Activity (BA) 4 Program Element (PE) 0603645A Armored System Modernization - Adv Dev Project EV7 Combat Vehicle Prototyping.
 Project ED7 Advanced Multipurpose (AMP) Cartridge transitions to Procurement.
 Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project EU3 .50 Caliber APTC.
 Project EU7 Enhanced Lethality Cannon Munitions transitions to Procurement.
 Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.
 Project XT2 40 millimeter (mm) Door Breach (DB) is a new start in Fiscal Year (FY) 2021.

A. Mission Description and Budget Item Justification

PE 0604802A Weapons and Munitions - Eng Dev funds multiple efforts for the engineering development of weapons and munitions systems.

Project 613, Mortar Systems: This Project supports Mortar System & Fire Control Modernization (MS&FCM) activities. The Mortar System and Fire Control Modernization Project funds engineering development and demonstration of new technologies that will support modernized mortar weapon and mortar fire control systems. This includes capabilities that provide commonality between current and future weapon and fire control systems to help mitigate technology shortfalls and critical capability gaps. Future mortar systems that address these gaps include (but are not limited to) remote mortar turrets for mounted mortar systems, high-pressure capable cannons/components, and composite/lightweight components for dismounted systems. Mortar Fire Control Systems capabilities include lightweight inertial

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<p>measurement and navigation (IMU/INU) units for weapon pointing, simplified Ethernet/wireless-based digital communications interfaces, development of updated fire control software to enable commonality, integration with existing/future platform interfaces, and support for commercial off-the-shelf (COTS)/modified commercial off-the-shelf (MCOTS) fire control components. FY 2021 funding will support development and prototyping of new mortar weapon system and mortar fire control system technologies.</p> <p>Project BY1, Next Generation Combat Vehicle Ammunition: 50x228 millimeter (mm) family of ammunition is a critical technology development in response to the Next Generation Combat Vehicle (NGCV) Abbreviated Capability Development Document for weapon qualification, platform integration, and fielding of the Optionally Manned Fighting Vehicle primary weapon system (XM913). This effort includes the development of three capabilities: The XM1202 Target Practice with Trace; the XM1203 Armor Piercing Fin Stabilized Discarding Sabot with Trace; and the XM1204 High Explosive Airburst with Trace. The training cartridge will allow the Warfighter to train in a cost effective manner and the tactical cartridges will provide enhanced lethality at increased ranges when engaging personnel threats in the open, defilade, and under the cover of urban structures, Anti-Tank Guided Missiles (ATGM) teams, and current and projected future peer armored materiel threats. This effort is operating under Middle Tier Acquisition authority for rapid prototyping to qualify the three munitions in order to support the NGCV Cross Functional Team (CFT) timeline for First Unit Equipped (FUE). FY 2021 funding will support Engineering and Manufacturing Development (EMD) for all cartridges.</p> <p>Project EC4, Non-Standard Simulator Munitions: This Project will standardize various pyrotechnics that simulate battlefield effects. The Army's Combat Training Centers (CTCs) are currently using non-standard munitions to replicate both conventional and asymmetric warfare battlefield effects. These modified commercial-off-the-shelf products have not been type classified or material released and are not safe or sustainable for use by Soldiers. This effort will develop and demonstrate various pyrotechnics/ simulators to replicate both conventional and asymmetric warfare battlefield affects such as: Black smoke signature (burning vehicles, buildings, and equipment); Yellow smoke signature (chemical, biological or nuclear effects); Macro pyrotechnics to simulate hostile fire and small Improvised Explosive Devices (IEDs) during mounted operations in urban terrain; Micro pyrotechnics to simulate indoor hostile fire and IED effects that are capable of being integrated into existing facilities; Rocket Propelled Grenade (RPG) simulators to replicate the flight of a Rocket Propelled Grenade; High Order Blast Effect (HiOBE) used to replicate a Vehicle Borne Improvised Explosive Device (VBIED), building explosions, and other significant explosive events; Artillery airburst simulator to replicate indirect fire; simulator to replicate a STINGER firing; Tracer Fire-back simulator to replicate enemy small arms fire and anti-aircraft fire. Standardization will reduce training costs, eliminate redundancies between systems and mitigate environmental concerns and safety risks associated with realistic scenario based training. FY 2021 funding will support Engineering and Manufacturing Development (EMD) for Artillery Airburst and Stinger, Black Smoke, Yellow Smoke, and Micro/Macro pyrotechnics.</p> <p>Project ED7, Advanced Multipurpose (AMP) Cartridge: This Project supports the XM1147 Advanced Multi Purpose (AMP) program, a direct fire line of sight 120mm large caliber munition under development for the Abrams Main Battle Tank. AMP has three modes of operation including point detonate, point detonate delay, and airburst. AMP is the materiel solution for breaching double reinforced concrete walls and defeating ATGM teams from 50m to 2000m threshold and 50m to 4500m objective, a validated gap that cannot currently be met with existing stockpiled ammunition. In addition to added capability, AMP will also consolidate the capabilities of four existing stockpiled 120mm munitions, thereby addressing the users' battlecarry dilemma by allowing them to load a single munition that is capable of defeating multiple targets including ATGM teams, reinforced walls, personnel, light armor, bunkers, and obstacles. The full performance of the AMP is obtained with an Abrams equipped Ammunition Data Link breach modification, the same required by the 120mm M829A4 cartridge that achieved Milestone C in FY 2014 and achieved Full Materiel Release in FY 2015. There is no funding requested in FY 2021.</p>		

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<p>Project EL9, Ammunition Logistics Prototyping: The Ammunition Logistics Prototyping Project supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This Project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. FY 2021 funding will be used to continue integrating the munitions health monitoring system with additional ammunition items, improve health monitoring survivability, and conduct qualification tests and continue to integrate passive time/temperature exposure sensors with additional ammunition items and conduct qualification testing.</p> <p>Project EP2, Shoulder-Launched Munitions: The Individual Assault Munition (IAM) will be a lightweight Shoulder Launched Munition (SLM) capability for combat units at the individual Soldier level. As an improvement over existing Shoulder Launched Munitions, the solution will fit within the Soldier Lethality Modernization Priority, by reducing Soldier load, while providing tactical innovation capable of extending overmatch against near-peer adversaries in a joint, multi-domain, high-intensity conflict. The IAM will allow Soldiers to conduct Urban Operations with an ability to defeat targets in an open space or in defilade at extended ranges. It will also allow Soldiers to defeat adversaries protected by field expedient structures and light armored vehicles. This solution will be effective day or night with the ability to safely engage targets from within enclosures using single hearing protection, increasing Soldier survivability. This solution will combine the capabilities of the existing Bunker Defeat Munition (BDM) and the AT4 Confined Space - Reduced Sensitivity (AT4CS-RS), which will allow for reduced Soldier load and training complexity, as well as reducing the logistics burden for Light Infantry, Combat Engineers, and Special Operations Forces. Fiscal Year (FY) 2021 funding will provide the Army the opportunity to evaluate various developmental munitions to achieve emerging increased capability as an Individual Assault Munition. The Individual Assault Munition Capabilities Development Document (CDD) was approved on 11 March 2016. FY 2021 funding will support the developmental shoulder-launched munition build and hardware testing to ensure the soldier has increased capabilities to engage targets at close and extended ranges, in the open, in defilade, behind field expedient structures.</p> <p>Project EP3, Reduced Range Ammunition - Small Caliber: The small caliber Reduced Range Ammunition (RRA) Project is a critical technology development in response to the 7.62 millimeter (mm) and .50 caliber Capabilities Development Documents (CDD). The overall objective of RRA is to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. The relatively long maximum range of the 7.62mm and .50 caliber service ammunition poses challenges on training ranges in range restricted areas. RRA will mitigate a training gap on installations by providing a materiel solution that meets training needs while shortening and condensing the SDZ. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted ranges. The RRA cartridge design will be compatible with all Army 7.62mm and .50 caliber weapons, but specifically optimized to work in the M240 and M2 Machine Guns. Fiscal Year (FY) 2021 funding supports continuing Engineering and Manufacturing Development (EMD) efforts, performing a Technical Readiness Review (TRR), conducting Production Qualification Testing (PQT), and performing activities to prepare for ammunition production transition to the Lake City Army Ammunition Plant (LCAAP) on the 7.62mm variant. FY 2021 also includes continuing the EMD effort, conducting a Critical Design Review (CDR), performing a User Evaluation / Soldier Touch Point (STP), and performing PQT on the 50 caliber variant. FY 2021 includes continuing activities to evaluate RRA ammunition prototypes and designs for the Next Generation Squad Weapon (NGSW) systems.</p> <p>Project EP4, One-Way Luminescence for Small Caliber Ammo: The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 Caliber Munitions CDD. Current small caliber ammunition</p>		

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tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL projects objective is to develop and field a full tracer round, replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability, and increasing lethality by incorporating Enhanced Performance Round (EPR) technology into the new tracer ammunition. 7.62mm and 5.56mm are the immediate focus; later followed by .50 Caliber cartridges and Next Generation Squad Weapons (NGSW) ammunition. Fiscal Year (FY) 2021 funding will support continuing Engineering and Manufacturing Development (EMD) efforts, performing Production Qualification Testing (PQT), performing Safety Release Tests, conducting Live-Fire Testing and Evaluation (LFT&E), conducting a Critical Design Review (CDR), conducting a Limited User Evaluation (LUE), and performing preparation activities for manufacturing at the Lake City Army Ammunition Plant (LCAAP) for the 7.62mm variant. FY 2021 funding will also support EMD efforts, Design Verification Tests (DVT), and preparation for the Preliminary Design Review (PDR) for the 5.56mm variant. FY 2021 also supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NGSW.

Project EP5, Adv Armor-Piercing (ADVAP) for Small Caliber Ammo: This Project supports both the Advanced Armor-Piercing ammunition and the Next Generation Squad Weapon (NGSW) Family of Ammunition.

- Advanced Armor-Piercing (ADVAP): Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Family of Ammunition Capabilities Development Documents (CDD). The nomenclature for the 7.62mm ADVAP is XM1158. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm. The ADVAP ammunition in calibers below 7.62mm for the Next Generation Squad Weapons (NGSW) is referred to as the Special Purpose ammunition. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. There is no funding requested in FY 2021.

- Next Generation Squad Weapon (NGSW) Family of Ammunition: The NGSW ammo is a new ammunition technology under development for use in the Next Generation Squad Weapon systems. The objective is to develop and FMR the new ammunition. No funding requested in Fiscal Year (FY) 2021 on Army Program Element (PE) 0604802A / Project EP5.

Project EP7, Aviation Airborne Expendable Countermeasures (AAECM): will support Integrated System Design (ISD), System Capability (SC) and Manufacturing Process Demonstrations (MPD) on current pyrotechnic munitions and tunable pyrotechnic aircraft countermeasures and decoys to include the XM215 Flare and Radio Frequency (RF) expendables. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army Research Development Technology & Evaluation (RDT&E) efforts are coordinated with Program Executive Office (PEO) Aviation to address the AAECM capability, a critical enabler for the Future Vertical Lift (FVL) - Aircraft Survivability Equipment (ASE) Cross Functional Team (CFT) within Army's Top modernization priorities.

These advanced decoys will address deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. The Project will also support ISD, SC and MPD on new expendable countermeasure munitions that will protect Army aircraft from advanced and current guided missile threats. Activities include modeling and simulation, flight testing, qualification testing, environmental considerations, safety enhancements, manufacturing enhancements, qualification of other service and foreign munitions that could meet current requirements, product improvements, insertion of new technologies to increase performance, and enhancement of current flare solutions for new and existing aircraft.

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<p>Systems include impulse cartridges and aircraft expendables (to include RF expendables). FY 2021 will support continued modeling and simulation and developmental testing for RF countermeasures and verification testing for the XM215 design.</p> <p>Project EU4, 40mm High Velocity (HV) High Explosive Dual Purpose: This Project supports the 40mm High Velocity (HV) High Explosive Dual Purpose- Airburst (HEDP-AB), a new capability identified in the 40mm High Velocity Improved High Explosive Dual Purpose Cartridge CDD and will provide the Mk19 Mod 3 Grenade Machine Gun (GMG) an airburst capable cartridge with the ability of achieving required lethal effects against enemy targets in the open and in defilade while maintaining the capability to defeat unarmored and lightly armored vehicles. FY 2021 funding supports Option 1 award activities and EMD activities including Developmental Testing & Evaluation (DT&E), Limited User Evaluation (LUE), Family of Weapon Sights - Crew Served (FWS-CS) and Common Remote Operating Weapons System (CROWS) Integration.</p> <p>Project EU5, .50 Caliber All-Purpose Tactical cartridge (APTC): The APTC project is a critical technology development in response to the .50 caliber Munitions Capabilities Development Documents (CDD). The overall objective of All-Purpose Tactical Cartridge is to deliver Ball and Tracer ammunition that replaces and improves current legacy .50 caliber ammunition. The All-Purpose Tactical Cartridge will be compatible with all Army .50 caliber weapons but specifically optimized to work in the M2 Machine Guns. Fiscal Year (FY) 2021 funding supports Engineering and Manufacturing Development (EMD), Milestone B (MS-B) accomplishment, conducting Design Verification Tests (DVT), and performing Pre-Production Qualification Tests (PPQT).</p> <p>Project EU6, 155mm HE Rocket Assist Project Extended Range: The 155mm High Explosive (HE) Rocket Assisted Projectile, Extended Range Project supports the development of materiel solutions to meet the Army's long range precision fires modernization strategy. This Project supports projectile development efforts to achieve ranges of 40 kilometers (km) in current artillery weapon systems (39 caliber tube length) and characterize longer ranges in future artillery weapon systems (58 caliber tube length Extended Range Cannon Artillery, (ERCA). These efforts will leverage enhanced lethality cannon munition technologies to compensate for increased rocket motor volume. The projectile body will be filled with an insensitive munition (IM) HE and a supplementary charge to improve soldier survivability. FY 2021 funding supports the Urgent Materiel Release (UMR) activities of XM1113 including fire control software integration and development and qualification testing for current artillery systems. FY 2021 funding will also support the continuation of characterization activities required for a projectile concept compatible with the ERCA weapon systems to achieve the Army's requirement of extended range lethality with precision accuracy by FY 2023.</p> <p>Project EU7, Enhanced Lethality Cannon Munitions: The Enhanced Lethality Cannon Munitions (ELCM) Project will evaluate, develop, and qualify new lethality technologies for 155mm cannon artillery munitions and evaluate their effectiveness in mitigating evolving and derived capability gaps, and support transition to production. The ELCM Project supports testing and assessment of the Israeli Military Industries (IMI) Systems M999 advanced anti-personnel munition in support the Army Directed Requirement for a Rapid Bridging Solution for the replacement of the 155mm Dual Purpose Improved Conventional Munition (DPICM). This Project also accelerates the qualification of the 155mm XM1128 High Explosive Projectile, which will replace the M795 Critical Munition once qualified. Engineering efforts are ongoing and will support the evaluation of the XM1128 test data to determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021. In FY 2021, this Project does not have an Research Development Technology & Evaluation request.</p>		

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<p>Project EU8, Improved Multi-Option Fuze: The Improved Multi-Option Fuze Project is a technology refresh and modernization effort that provides an incremental capability with technology advancements and performance improvements on the current non-precision artillery and mortar ammunition proximity multi-option fuze that will increase robustness to electronic countermeasures (ECM), eliminates the susceptibility of reverse engineering (RE), incorporates power source advancements, improves delay mode reliability, and integrates safe & arm improvements. This Project will develop and qualify safe, affordable, reliable, Proximity Height of Burst fuzing solutions with robust Defense Exportability Features (DEF) for non-precision conventional cannon artillery and mortar munitions that are resistant to adversary exploitation via ECM and RE threats. FY 2021 funding will support Improved Multi-Option Fuze Mortar (iMOFM) design verification, hardware fabrication, qualification testing, and Fuze Qualification Testing for both Multi-Option Fuze Artillery (MOFA) II and iMOFM.</p> <p>Project EW1, 40mm Low Velocity Ammunition: The 40mm Low Velocity High Explosive Air Burst (HEAB) is a new capability identified as a Warfighter requirement in the CDD, 40mm Low Velocity (LV) Family of Ammunition Annex. The 40mm Low Velocity HEAB tactical cartridge allows the warfighter to engage targets at increased effective ranges using the 40mm M320 Grenade Launcher. The HEAB cartridge provides the grenadier with a higher probability of achieving a first shot kill against enemy personnel, coupled with the ability to defeat personnel targets in defilade positions. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel beyond those offered by the current M433 High Explosive Dual Purpose (HEDP) cartridge. The cartridge provides lethal effects against targets with improved accuracy and greater standoff ranges increasing Soldier Survivability. FY 2021 will support any remaining DET 3 build, Design Engineering Test (3), Developmental Test and Evaluation (DT&E) build and test, and Soldier Touch Point (Limited User Evaluation), Critical Design Review, Test Readiness Reviews (TRRs) and Milestone (MS) C preparations.</p> <p>Project FA6, 30mm Lethality: This Project funds the development of a suite of 30x173mm caliber cartridges, which includes a HEAB cartridge XM1182 for increased anti-personnel effects, an Armor Piercing (AP) cartridge XM1170 for anti-material, and target practice cartridges XM1172 & XM1173 that are ballistically matched to the tactical cartridges. A non-developmental airburst munition will be Urgent Materiel Released (UMR) as an interim solution prior to HEAB. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV), Next Generation Combat Vehicle (NGCV), and any Army Fighting Vehicles that are equipped with a 30x173mm weapon system. The tactical AP cartridge will provide an organic direct fire capability to support infantry at a greater range and will improve lethality when engaging light-to-medium armored vehicles. The HEAB cartridge will provide the Warfighter with increased lethality against troops in the open, counter defilade, ATGM teams, and troops in urban structures. The training cartridges will be ballistically matched to the tactical cartridges, allowing the Warfighter to train in a cost effective manner. This Project will leverage earlier efforts in support of the Stryker Operational Needs Statement (ONS) for Increased Lethality for the 2nd Calvary Regiment (2CR), United States Army Europe (USAREUR) (HQDA ONS 15-20590). FY 2021 funding will support Design Engineering Testing and Developmental Test & Evaluation (DT&E) prototype development .</p> <p>Project FJ4, Cannon-Deliverd Area Effects Munitions (C-DAEM): The C-DAEM Project will provide United States (U.S.) ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018 to inform Army acquisition and investment decisions regarding replacement of the current stockpile of 155mm Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense (DoD) policy compliant munitions and address anti-armor and extended range capability requirements. The Army validated two materiel solutions for C-DAEM to be pursued in parallel. C-DAEM Armor (Increment 1) will destroy moved and moving infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM DPICM Replacement (Increment 2) will destroy personnel to light-skinned vehicles. FY 2020 funding will support qualification</p>		

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<p>of C-DAEM DPICM Replacement solution(s) for safety, performance, and DoD policy compliance verification testing to support the Army's modernization priorities in support of the National Defense Strategy.</p> <p>Project FL4, Small Caliber Ammo for Next Gen Squad Weapons: The Small Caliber Ammo for Next Gen Squad Weapons project is a critical technology development in response to the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) for the ammunition required to support the rapid prototyping, development, and fielding of the Next Generation Squad Weapons (NGSW) under the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. The objective is to develop and Full Materiel Release (FMR) the new ammunition in parallel with the NGSW rifle and automatic rifle. The NGSW ammunition is split into two initial projectile variants, the General Purpose (GP) and the Special Purpose (SP). Fiscal Year (FY) 2021 funding supports continuing rapid prototyping/development of the GP projectile, building prototypes and delivering prototypes to the weapon system contractors for integration into the weapon system development, conducting prototype testing and engineering testing. FY 2021 also supports continuing rapid prototyping for the SP projectile, conducting a Critical Design Review (CDR), conducting prototype testing and engineering testing. FY 2021 supports development of prototype solutions for the Reduced Range Ammunition (RRA) variant; to include building and evaluating RRA concepts/designs, and conducting a Preliminary Design Review (PDR). FY 2021 also includes development efforts to evaluate competing concepts/solutions for the tracer ammunition variant required for the NGSW; including maturing/refining tracer ammunition designs and performing engineering tests. FY 2021 supports initial activities to evaluate potential solutions/prototypes and concepts to satisfy follow-on NGSW ammunition requirements. Follow-on NGSW ammunition types includes: Blank and Close Combat Mission Capability Kit (CCMCK) training ammunition. Development efforts on the follow-on NGSW ammunition variants will continue into FY 2022. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy.</p> <p>Project S36, Precision Guidance Kit: The Precision Guidance Kit (PGK) M1156 is a course correcting fuze that provides precision accuracy and efficiency for current and future 155mm High Explosive (HE) projectiles by eliminating a portion of the inherent errors associated with ballistic firing solutions, which effectively reduces the number of projectiles required to execute fire missions. PGK utilizes a Global Positioning System (GPS) receiver and internal Guidance and Navigation Computer to accomplish its mission with point detonating and height of burst fuzing functions. The PGK M1156E1 development effort, Long Range-PGK (LR-PGK), will qualify state of the art technologies for operation in GPS degraded environments and compatibility with Army Modernization objectives under the Long Range Precision Fires (LRPF) CFT's new long range cannon, ERCA. The ERCA and its new long range projectiles require the LR-PGK to meet requirements, and will be fielded during the PGK Life Cycle. LR-PGK supports the Army's modernization priorities in support of the National Defense Strategy and future 155mm projectiles and M777 Long Range Cannon (LRC) initiatives. FY 2021 funding supports the award of a follow-on EMD contract for system design and prototype development for LR-PGK.</p> <p>Project XT2, 40mm Door Breach: The 40mm Low Velocity (LV) Door Breach (DB), XM1167, cartridge allows the grenadier to conduct a ballistic breach of an existing door to create an entry point into a building or other structure. This capability is critical during Urban Operations, while having stand-off ability to conduct ballistic breach at ranges up to 50 meters away, with a single-shot, and without pause between actual breach and entry of initial force. The 40mm Door Breach cartridge will provide the small unit with the capability to conduct efficient breaching operations; allowing the Warfighter to create an entry point into a structure for an assault element to enter and begin clearing operations, one of the most difficult types of operations that Soldiers may face in an urban environment. The 40mm Door Breach cartridge will reduce collateral damage and friendly casualties associated with breaching operations. The deployment of 40mm Door Breach cartridges will enable the small unit to gain and maintain a tactical advantage through efficiency of combat power and momentum. FY 2021 will consist of Developmental Testing and Evaluation (DT&E) for the purpose of qualifying the Door Breach cartridge design.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	172.744	181.023	134.960	-	134.960
Current President's Budget	173.713	186.323	265.811	-	265.811
Total Adjustments	0.969	5.300	130.851	-	130.851
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-4.700			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.969	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	130.851	-	130.851

Change Summary Explanation

Project BY1 Next Generation Combat Vehicle Ammunition transitions from BA 4 PE 0603645A Armored System Modernization - Adv Dev Project EV7 Combat Vehicle Prototyping.

Project ED7 Advanced Multipurpose (AMP) Cartridge transitions to Procurement.

Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project EU3 .50 Caliber APTC.

Project EU7 Enhanced Lethality Cannon Munitions transitions to Procurement.

Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.

Project XT2 40 millimeter (mm) Door Breach (DB) is a new start in FY 2021.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS
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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
613: MORTAR SYSTEMS	-	0.000	5.792	1.409	-	1.409	0.000	0.000	0.000	7.993	0.000	15.194
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Mortar System and Fire Control Modernization Project funds engineering development and demonstration of new technologies that will support modernized mortar weapon and mortar fire control systems. This includes capabilities that provide commonality between current and future weapon and fire control systems to help mitigate technology shortfalls and critical capability gaps. Future mortar systems that address these gaps include (but are not limited to) remote mortar turrets for mounted mortar systems, high-pressure capable cannons/components, and composite/lightweight components for dismounted systems. Mortar Fire Control Systems capabilities include lightweight inertial measurement and navigation (IMU/INU) units for weapon pointing, simplified Ethernet/wireless-based digital communications interfaces, development of updated fire control software to enable commonality, integration with existing/future platform interfaces, and support for commercial off-the-shelf (COTS)/modified commercial off-the-shelf (MCOTS) fire control components. Fiscal Year (FY) 2021 funding will support development and prototyping of new mortar weapon system and mortar fire control system technologies.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Mortar System & Fire Control Modernization	-	5.529	1.409	-	1.409
Description: Mortar Systems and Fire Control Modernization initiatives include development and demonstration of new technologies to validate production potential for future mortar systems; including remote turrets and new weapon system components, modernized lightweight pointing device, updated Line Replaceable Units (LRUs), streamlined digital communications, and updated mortar fire control software.					
FY 2020 Plans: FY 2020 funds supported engineering initiatives and prototyping of fire control LRU and software.					
FY 2021 Base Plans: FY 2021 funds will continue the support development and prototyping of new mortar weapon system and mortar fire control system technologies.					
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 decrease funding supports current Mortar System and Fire Control Modernization efforts in engineering development and demonstration of new technologies for modernized Mortar System and Fire Control systems.					
Title: FY 2020 SBIR/STTR Transfer	-	0.263	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	-	5.792	1.409	-	1.409

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• AD9300: Mortar Fire Control Systems Modifications	-	10.000	7.292	-	7.292	4.196	8.091	6.494	-	0.000	36.073
• K99200: Computer Ballistics: LHMBBC XM32	9.513	3.838	7.509	0.280	7.789	7.241	7.235	7.239	9.405	0.000	52.260
• K99300: Mortar Fire Control System	29.149	29.174	3.800	13.672	17.472	4.186	5.783	8.063	3.797	0.000	97.624
• G02200: Mortar Systems	24.312	33.026	10.288	10.460	20.748	11.678	11.558	10.018	16.791	Continuing	Continuing
• G02100: Mortar Modification	3.965	1.693	1.689	-	1.689	1.689	1.690	1.690	-	0.000	12.416

Remarks
Other Procurement, Army (OPA) Funding / Procurement of Weapons & Tracked Combat Vehicle (W&TCV)

D. Acquisition Strategy
The Mortar System and Fire Control Modernization strategy is using the Department of Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives for hardware and software development during Engineering Manufacturing Design Phase. A new Federal Acquisition Regulation (FAR) based contract will be awarded to complete full rate production.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army											Date: February 2020				
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev					Project (Number/Name) 613 / MORTAR SYSTEMS				

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mortar System & Fire Control Modernization - Project Manager Office Support	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.178	-		0.012	Nov 2019	0.050	Nov 2020	-		0.050	0.000	0.240	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.263		-		-		-	0.000	0.263	-
Subtotal			0.178	-		0.275		0.050		-		0.050	0.000	0.503	N/A

Remarks
Program management includes travel and documentation support.

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mortar System & Fire Control Modernization - Fire Control Common Pointing	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : TBD	-	-		1.252	Jun 2020	1.234	Mar 2021	-		1.234	0.000	2.486	-
Mortar System & Fire Control Modernization - Turreted Mortar FCT Compatibility	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : TBD	-	-		0.462	Aug 2020	-		-		-	0.000	0.462	-
Mortar System & Fire Control Modernization - Fire Control Common Pointing	MIPR	DoD Ordnance Technology Consortium (DOTC) - Inertial Labs : Paeonian Springs, VA	2.194	-		0.962	Jun 2020	-		-		-	0.000	3.156	-
Subtotal			2.194	-		2.676		1.234		-		1.234	0.000	6.104	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) 613 / <i>MORTAR SYSTEMS</i>

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Mortar System and Fire Control Modernization (MS&FCM)																												
MS&FCM- Engineering & Manufacturing Development (EMD)																												
MS&FCM - LRU Software Development																												
MS&FCM- System Architecture Development (Sys Eng Phase 1)																												
MS&FCM- Preliminary Design Review (PDR)																												
MS&FCM- EMD Detailed Design Testing (Sys Eng Phase 2)																												
MS&FCM- Critical Design Review (CDR)																												
MS&FCM-Fire Control Software Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) 613 / <i>MORTAR SYSTEMS</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Mortar System and Fire Control Modernization (MS&FCM)	1	2020	1	2020
MS&FCM- Engineering & Manufacturing Development (EMD)	1	2020	4	2021
MS&FCM - LRU Software Development	1	2020	4	2021
MS&FCM- System Architecture Development (Sys Eng Phase 1)	1	2020	1	2021
MS&FCM- Preliminary Design Review (PDR)	1	2021	1	2021
MS&FCM- EMD Detailed Design Testing (Sys Eng Phase 2)	2	2021	4	2021
MS&FCM- Critical Design Review (CDR)	4	2021	4	2021
MS&FCM-Fire Control Software Development	1	2025	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev					Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition		
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
BY1: Next Generation Combat Vehicle Ammunition	-	0.000	0.000	23.017	-	23.017	14.986	8.792	5.995	0.000	0.000	52.790
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project BY1 Next Generation Combat Vehicle Ammunition transitions from Budget Activity (BA) 4 Program Element (PE) 0603645A Armored System Modernization - Adv Dev Project EV7 Combat Vehicle Prototyping in Fiscal Year (FY) 2021.

A. Mission Description and Budget Item Justification

50x228 millimeter (mm) family of ammunition is a critical technology development in response to the Next Generation Combat Vehicle (NGCV) Abbreviated Capability Development Document for weapon qualification, platform integration, and fielding of the Optionally Manned Fighting Vehicle primary weapon system (XM913). This effort includes the development of three capabilities: The XM1202 Target Practice with Trace; the XM1203 Armor Piercing Fin Stabilized Discarding Sabot with Trace; and the XM1204 High Explosive Airburst with Trace. The training cartridge will allow the Warfighter to train in a cost effective manner and the tactical cartridges will provide enhanced lethality at increased ranges when engaging personnel threats in the open, defilade, and under the cover of urban structures, Anti-Tank Guided Missiles (ATGM) teams, and current and projected future peer armored materiel threats. This effort is operating under Middle Tier Acquisition authority for rapid prototyping to qualify the three munitions in order to support the NGCV Cross Functional Team (CFT) timeline for First Unit Equipped (FUE). FY 2021 funding will support Engineering and Manufacturing Development (EMD) for all cartridges.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 50x228mm Ammunition Development	-	-	23.017	-	23.017
Description: Qualify 50mm Target Practice with Trace (TP-T), Armour-Piercing Fin-Stabilized Discarding Sabot with Trace (APFSDS-T), and High Explosive Airburst with Trace (HEAB-T) ammunition through the rapid prototyping phase.					
FY 2021 Base Plans: Funding will be used to support the continued development of TP-T, APFSDS-T, and HEAB-T ammunition. In addition, the funding will also be used to support Displaced Equipment Training (DET) and hardware build for Developmental Test & Evaluation (DT&E) for each of the three 50mm cartridges.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) BY1 / <i>Next Generation Combat Vehicle Ammunition</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Project BY1 Next Generation Combat Vehicle Ammunition transitions from BA 4 PE 0603645A Armored System Modernization - Adv Dev Project EV7 Combat Vehicle Prototyping.					
Accomplishments/Planned Programs Subtotals	-	-	23.017	-	23.017

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• E07610: <i>CTG, 30MM, Progrmabl Air Burst Mun, Mk310, Linked</i>	1.765	13.412	14.550	-	14.550	30.478	53.444	154.048	154.347	0.000	422.044

Remarks
Funding for production to start in FY 2023 for NGCV Ammunition. The funding, in part, currently residing on the 30MM Mk310 BLIN E07610 will be re-aligned to a new 50MM Next Generation Combat Vehicle Ammunition Budget Line (E80011) prior to President's Budget (PB) 2022 submission.

D. Acquisition Strategy
Department of Defense Ordnance and Technology Consortium (DOTC) OTA will be used to support the rapid prototyping efforts for the 50 x 228mm TP-T, APFSDS-T, and HEAB-T cartridges. These efforts will consist of EMD, which includes DET, technical reviews, and Developmental Test and Evaluation (DT&E). The DOTC contracts will conclude upon successfully performing qualification testing DT&E scheduled for FY 2022 for the Target Practice with Trace (TP-T), FY 2023 for the APFSDS-T and FY 2024 for the HEAB-T cartridges. Low Rate Initial Production (LRIP) will be competed in follow-on production contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				BY1 / Next Generation Combat Vehicle Ammunition							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
50x228mm APFSDS-T Ammunition Development & Test Evaluation Hardware Contract	C/CPFF	TBS : TBS	-	-		-		2.000	Mar 2021	-		2.000	0.000	2.000	-
50x228mm TP-T Ammunition Development & Test Evaluation Hardware Contract	C/CPFF	TBS : TBS	-	-		-		2.000	Mar 2021	-		2.000	0.000	2.000	-
50x228mm HEAB-T Ammunition Design Engineering Test Hardware Contract	C/CPFF	TBS : TBS	-	-		-		11.978	Mar 2021	-		11.978	0.000	11.978	-
Subtotal			-	-		-		15.978		-		15.978	0.000	15.978	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
50x228mm Ammo Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny, NJ	-	-		-		3.339	Dec 2020	-		3.339	0.000	3.339	-
Subtotal			-	-		-		3.339		-		3.339	0.000	3.339	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
50x228mm Design Engineering Testing	MIPR	Aberdeen Proving Ground (APG) : Aberdeen, MD	-	-		-		3.700	Jan 2021	-		3.700	0.000	3.700	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
50mm TP-T & APFSDS-T EMD Award					▲ 1																								
50mm TP-T & APFSDS-T EMD																													
50mm TP-T & APFSDS-T Design Engineering Test Build																													
50mm TP-T & APFSDS-T Design Engineering Testing																													
50mm TP-T & APFSDS-T Critical Design Review (CDR)																													
50mm TP-T & APFSDS-T Development Test & Evaluation Build																													
50mm TP-T & APFSDS-T Development Test & Evaluation																													
50mm TP-T & APFSDS-T Milestone C																													
50mm TP-T & APFSDS-T Production Contract Award																													
50mm TP-T & APFSDS-T Low Rate Initial Production (LRIP)																													
50mm TP-T & APFSDS-T Type Classification-Standard																													
50mm TP-T & APFSDS-T Full Rate Production (FRP)																													
50mm HEAB-T EMD Award																													

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025																																																																																																																																																																																																																																																																																																																																																																																																											
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50mm HEAB-T Engineering & Manufacturing Development (EMD)																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) BY1 / <i>Next Generation Combat Vehicle Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
50mm TP-T & APFSDS-T EMD Award	2	2020	2	2020
50mm TP-T & APFSDS-T EMD	2	2020	3	2023
50mm TP-T & APFSDS-T Design Engineering Test Build	4	2020	2	2021
50mm TP-T & APFSDS-T Design Engineering Testing	2	2021	3	2021
50mm TP-T & APFSDS-T Critical Design Review (CDR)	4	2021	4	2021
50mm TP-T & APFSDS-T Development Test & Evaluation Build	4	2021	2	2022
50mm TP-T & APFSDS-T Development Test & Evaluation	3	2022	1	2024
50mm TP-T & APFSDS-T Milestone C	3	2023	3	2023
50mm TP-T & APFSDS-T Production Contract Award	3	2023	3	2023
50mm TP-T & APFSDS-T Low Rate Initial Production (LRIP)	3	2023	4	2024
50mm TP-T & APFSDS-T Type Classification-Standard	4	2024	4	2024
50mm TP-T & APFSDS-T Full Rate Production (FRP)	4	2024	4	2027
50mm HEAB-T EMD Award	2	2020	2	2020
50mm HEAB-T EMD	2	2020	2	2024
50mm HEAB-T Design Engineering Testing 1 Build	2	2020	4	2020
50mm HEAB-T Design Engineering Testing 1	1	2021	2	2021
50mm HEAB-T Design Engineering Testing 2 Build	3	2021	1	2022
50mm HEAB-T Design Engineering Testing 2	2	2022	3	2022
50mm HEAB-T Critical Design Review (CDR)	4	2022	4	2022
50mm HEAB-T Development Test & Evaluation Build	1	2023	3	2023
50mm HEAB-T Development Test & Evaluation	4	2023	1	2024
50mm HEAB-T Milestone C	2	2024	2	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) BY1 / <i>Next Generation Combat Vehicle Ammunition</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
50mm HEAB-T Production Contract Award	3	2024	3	2024
50mm HEAB-T Low Rate Initial Production (LRIP)	3	2024	3	2025
50mm HEAB-T Type Classification- Standard (TC-STD)	3	2025	3	2025
50mm HEAB-T Full Rate Production (FRP)	3	2025	3	2027

Note

Notes:

Target Practice with Trace (TP-T)

Armour-Piercing Fin-Stabilized Discarding Sabot with Trace (APFSDS-T)

High Explosive Airburst with trace (HEAB-T)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EC4 / Non-Standard Simulator Munitions			
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
EC4: Non-Standard Simulator Munitions	-	2.899	2.644	2.236	-	2.236	2.143	2.133	2.121	0.398	0.000	14.574
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EC4 Non-Standard Simulator Munitions will standardize various pyrotechnics that simulate battlefield effects. The Army's Combat Training Centers (CTCs) are currently using non-standard munitions to replicate both conventional and asymmetric warfare battlefield effects. These modified commercial-off-the-shelf products have not been type classified or material released and are not safe or sustainable for use by Soldiers. This effort will develop and demonstrate various pyrotechnics/simulators to replicate both conventional and asymmetric warfare battlefield effects such as: Black smoke signature (burning vehicles, buildings, and equipment); Yellow smoke signature (chemical, biological or nuclear effects); Macro pyrotechnics to simulate hostile fire and small Improvised Explosive Devices (IEDs) during mounted operations in urban terrain; Micro pyrotechnics to simulate indoor hostile fire and IED effects that are capable of being integrated into existing facilities; Rocket Propelled Grenade (RPG) simulators to replicate the flight of a Rocket Propelled Grenade; High Order Blast Effect (HiOBE) used to replicate a Vehicle Borne Improvised Explosive Device (VBIED), building explosions, and other significant explosive events; Artillery airburst simulator to replicate indirect fire; simulator to replicate a STINGER firing; Tracer Fire-back simulator to replicate enemy small arms fire and anti-aircraft fire. Standardization will reduce training costs, eliminate redundancies between systems and mitigate environmental concerns and safety risks associated with realistic scenario based training.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Standardize of Special Use Ammunition	2.899	2.524	2.236	-	2.236
Description: Standardize non-standard pyrotechnic battlefield effects currently used by CTCs.					
FY 2020 Plans: This project supported the Engineering and Manufacturing Development (EMD) phases for Artillery Airburst, Stinger, Black Smoke and Yellow Smoke to include Energetic Material Qualification (EMQ) testing. Evaluated the following Commercial Off the Shelf (COTS) items for environmental and safety considerations: Macro/Micro, RPG on a wire, HiOBE and Tracer-Fire back.					
FY 2021 Base Plans: This project will continue to support the EMD phase for Artillery Airburst and Stinger, Black Smoke, Yellow Smoke, and Micro/Macro pyrotechnics.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Change in funding from FY 2020 to FY 2021 due to entry into the EMD phase of select efforts within the overall program.					
Title: FY 2020 SBIR/STTR Transfer	-	0.120	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	2.899	2.644	2.236	-	2.236

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• E88404: SIMULATORS, Non-Standard, Special Effects, f/CTCs	-	1.699	1.748	-	1.748	0.282	0.289	0.289	0.289	0.000	4.596

Remarks

D. Acquisition Strategy

The Acquisition strategy is to incrementally develop and field a family of special use ammunition. Milestone Decision Document (MDD) approval 1st Quarter FY 2020. Initial special use ammunition to be fielded will be the black smoke simulator followed by additional training simulators as required in the Future Army System of Integrated Targets (FASIT) Capability Production Document (CPD).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EC4 / Non-Standard Simulator Munitions								
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.120		-		-		-	0.000	0.120	-	
Subtotal			-	-		0.120		-		-		-	0.000	0.120	N/A	
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Product Development	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	1.134	1.386	May 2019	0.760	May 2020	0.600	Oct 2020	-		0.600	0.000	3.880	-	
Subtotal			1.134	1.386		0.760		0.600		-		0.600	0.000	3.880	N/A	
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Engineering Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	1.665	0.600	Feb 2019	1.123	Jan 2020	1.156	Oct 2020	-		1.156	0.000	4.544	-	
Subtotal			1.665	0.600		1.123		1.156		-		1.156	0.000	4.544	N/A	
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Test and Evaluation	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	0.541	0.913	Jun 2019	0.641	Jun 2020	0.480	Jun 2021	-		0.480	0.000	2.575	-	
Subtotal			0.541	0.913		0.641		0.480		-		0.480	0.000	2.575	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army								Date: February 2020					
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EC4 / Non-Standard Simulator Munitions					
	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.340	2.899		2.644		2.236		-		2.236	0.000	11.119	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Artillery Airburst and Stinger																												
Artillery Airburst and Stinger Milestone B					2																							
Artillery Airburst and Stinger Engineering Manufacturing and Development					Artillery & Stinger MS-B																							
Artillery and Stinger MS C									10																			
Artillery and Stinger Production													Artillery & Stinger MS C															
Black Smoke																												
Black Smoke Milestone B					4																							
Black Smoke Engineering Manufacturing and Development					Black Smoke MS-B																							
Black Smoke Milestone C									9																			
Black Smoke Production													Black Smoke MS-C															
Yellow Smoke																												
Yellow Smoke Milestone B					6																							
Yellow Smoke Engineering Manufacturing and Development					Yellow Smoke MS-B																							
									Yellow Smoke EMD																			

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025					
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
Yellow Smoke Milestone C													▲ 11 Yellow Smoke MS-C																	
Yellow Smoke Production																	[Blue Bar]													
Micro/Macro																														
Micro/Macro Milestone B					▲ 8 Micro/Macro MS-B																									
Micro/Macro Engineering Manufacturing and Development									[Blue Bar]																					
Micro/Macro Milestone C																	▲ 18 Micro/Macro MS-C													
Micro/Macro Production																					[Blue Bar]									
RPG																														
RPG Milestone B													▲ 13 RPG MS-B																	
RPG Engineering Manufacturing and Development																	[Blue Bar]													
RPG Milestone C																									▲ 19 RPG MS-C					
RPG Production																													[Blue Bar]	
HIOBE																														

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
HiOBE Milestone B													15 HiOBE MS-B															
HiOBE Engineering Manufacturing and Development													HiOBE EMD															
HiOBE Milestone C																					21 HiOBE MS-C							
HiOBE Production																					HiOBE Product							
Tracer																												
Tracer Milestone B													17 Tracer MS-B															
Tracer Engineering Manufacturing and Development													Tracer EMD															
Tracer Milestone C																					20 Tracer MS-C							
Tracer Production																					Tracer Production							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Artillery Airburst and Stinger	3	2020	3	2020
Artillery Airburst and Stinger Milestone B	3	2020	3	2020
Artillery Airburst and Stinger Engineering Manufacturing and Development	3	2020	4	2021
Artillery and Stinger MS C	4	2021	4	2021
Artillery and Stinger Production	4	2021	4	2028
Black Smoke	3	2020	3	2020
Black Smoke Milestone B	3	2020	3	2020
Black Smoke Engineering Manufacturing and Development	3	2020	2	2021
Black Smoke Milestone C	2	2021	2	2021
Black Smoke Production	2	2021	4	2026
Yellow Smoke	4	2020	4	2020
Yellow Smoke Milestone B	4	2020	4	2020
Yellow Smoke Engineering Manufacturing and Development	4	2020	1	2022
Yellow Smoke Milestone C	1	2022	1	2022
Yellow Smoke Production	2	2022	4	2025
Micro/Macro	4	2020	4	2020
Micro/Macro Milestone B	4	2020	4	2020
Micro/Macro Engineering Manufacturing and Development	4	2020	1	2023
Micro/Macro Milestone C	1	2023	1	2023
Micro/Macro Production	2	2023	1	2032
RPG	3	2022	3	2022
RPG Milestone B	3	2022	3	2022

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions
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Events	Start		End	
	Quarter	Year	Quarter	Year
RPG Engineering Manufacturing and Development	3	2022	4	2024
RPG Milestone C	4	2024	4	2024
RPG Production	1	2025	1	2030
HiOBE	4	2022	4	2022
HiOBE Milestone B	4	2022	4	2022
HiOBE Engineering Manufacturing and Development	4	2022	2	2025
HiOBE Milestone C	2	2025	2	2025
HiOBE Production	2	2025	1	2029
Tracer	1	2023	1	2023
Tracer Milestone B	1	2023	1	2023
Tracer Engineering Manufacturing and Development	1	2023	2	2025
Tracer Milestone C	2	2025	2	2025
Tracer Production	2	2025	3	2029

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev					Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge		
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
ED7: Advanced Multipurpose (AMP) Cartridge	-	20.814	14.100	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	34.914
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project ED7 Advanced Multipurpose (AMP) Cartridge transitions to Procurement.

A. Mission Description and Budget Item Justification

The XM1147 Advanced Multi Purpose (AMP) program is a direct fire line of sight 120 millimeter (mm) large caliber munition under development for the Abrams Main Battle Tank. AMP has three modes of operation including point detonate, point detonate delay, and airburst. AMP is the materiel solution for breaching double reinforced concrete walls and defeating Anti Tank Guided Missile (ATGM) teams from 50 Meter (m) to 2000m threshold and 50m to 4500m objective, a validated gap that cannot currently be met with existing stockpiled ammunition. In addition to added capability, AMP will also consolidate the capabilities of four existing stockpiled 120mm munitions, thereby addressing the users' battlecarry dilemma by allowing them to load a single munition that is capable of defeating multiple targets including ATGM teams, reinforced walls, personnel, light armor, bunkers, and obstacles. The full performance of the AMP is obtained with an Abrams equipped Ammunition Data Link breach modification, the same required by the 120mm M829A4 cartridge that achieved Milestone C in Fiscal Year (FY) 2014 and achieved Full Materiel Release in FY 2015. In FY 2021 there is no funding request.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Engineering and Manufacturing Development (EMD) Phase 2	20.064	13.460	-	-	-
Description: Design, develop and test components and cartridges leading to a design freeze. The final design will then be carried forward to Developmental Test and Evaluation (DT&E) qualification testing to demonstrate the cartridge's ability to meet performance requirements prior to production.					
FY 2020 Plans: Engineering Manufacturing Development Phase 2 continued with the initiation and completion of DT&E build which included Limited User and Live Fire Testing, Initial Operation Test Planning, preparation for transition to Low Rate Initial Production at Milestone C, and Milestone C approval.					
FY 2020 to FY 2021 Increase/Decrease Statement: Project ED7 Advanced Multipurpose (AMP) Cartridge transitions to Procurement.					
Title: Evaluation for Future Combat Platforms	0.250	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Evaluation of the scalability for future combat platforms.					
Title: Training Round Demonstration	0.500	-	-	-	-
Description: Demonstrate feasibility of a training round for AMP					
Title: FY 2020 SBIR/STTR Transfer	-	0.640	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	20.814	14.100	-	-	-

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• E88105: CTG, 120MM TANK, HEMP-T, XM1147	16.398	10.000	38.989	-	38.989	46.893	46.902	44.463	29.970	0.000	233.615

Remarks

D. Acquisition Strategy
The XM1147 AMP Program achieved Milestone B and entered EMD in FY 2015. EMD consists of two phases; Phase 1 awarded two contracts in FY 2015 to competitively prototype. A cartridge demonstration test was conducted and was used to support down-select to a single contractor for EMD Phase 2, which will lead to Milestone C in 2020 followed by two Low Rate Initial Productions in FY 2020 and FY 2021 and one optional year of full procurement in FY 2022. Explore options to increase future competition and facilitate effective training.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				ED7 / Advanced Multipurpose (AMP) Cartridge							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.640		-		-		-	0.000	0.640	-
Subtotal			-	-		0.640		-		-		-	0.000	0.640	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : NJ	5.047	0.889	Dec 2018	0.298	Dec 2019	-		-		-	Continuing	Continuing	Continuing
Engineering Manufacturing & Development Contract	C/CPIF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	76.992	9.519	Feb 2019	3.237	Nov 2019	-		-		-	Continuing	Continuing	Continuing
Subtotal			82.039	10.408		3.535		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	MIPR	Combat Capabilities Development Command - Armaments Center (CCDC-AC) : Picatinny, NJ	9.943	2.578	Oct 2018	1.437	Nov 2019	-		-		-	Continuing	Continuing	Continuing
Subtotal			9.943	2.578		1.437		-		-		-	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering and Manufacturing Development (EMD) Phase II	[Blue bar spanning FY 2019 Q1-Q4, FY 2020 Q1-Q4]																											
Critical Design Review	[Blue bar spanning FY 2019 Q4, FY 2020 Q1]																											
Developmental Test and Evaluation (DT&E)	[Blue bar spanning FY 2020 Q2-Q4]																											
Milestone C	[Blue bar spanning FY 2020 Q4, FY 2021 Q1]																											
Low Rate Initial Production 1	[Blue bar spanning FY 2021 Q1-Q4]																											
Live Fire Test and Evaluation	[Blue bar spanning FY 2021 Q2]																											
Initial Operational Test and Evaluation	[Blue bar spanning FY 2021 Q3]																											
Low Rate Initial Production 2	[Blue bar spanning FY 2021 Q3-Q4]																											
Training Round Demonstration	[Blue bar spanning FY 2019 Q1-Q2]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) ED7 / <i>Advanced Multipurpose (AMP) Cartridge</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone B	1	2015	1	2015
Engineering and Manufacturing Development (EMD) Contract Phase I Awards	4	2015	4	2015
Engineering and Manufacturing Development (EMD) Phase I	4	2015	2	2017
Preliminary Design Review (PDR)	3	2016	3	2016
EMD Contract Phase II Award / Down-Select	2	2017	2	2017
Engineering and Manufacturing Development (EMD) Phase II	2	2017	4	2020
Critical Design Review	1	2020	1	2020
Developmental Test and Evaluation (DT&E)	2	2020	4	2020
Milestone C	4	2020	4	2020
Low Rate Initial Production 1	4	2020	4	2021
Live Fire Test and Evaluation	2	2021	2	2021
Initial Operational Test and Evaluation	2	2021	2	2021
Low Rate Initial Production 2	2	2021	2	2022
Evaluation for Future Combat Platforms	1	2018	4	2018
Training Round Demonstration	1	2019	3	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EL9 / Ammunitions Logistics Prototyping			
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
EL9: Ammunitions Logistics Prototyping	-	1.684	2.329	1.701	-	1.701	0.704	0.999	1.019	1.039	0.000	9.475
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EL9 Ammunitions Logistics Prototyping supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. Fiscal Year (FY) 2021 funding will continue integrating the munitions health monitoring system with additional ammunition items, improve health monitoring survivability, and conduct qualification tests and continue to integrate passive time/temperature exposure sensors with additional ammunition items and conduct qualification testing. All research and development initiatives will be supporting the cross functional teams and the multi domain operations modernization objectives through deployment of prototypes for user evaluation.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Munitions Survivability and Logistics Enablers	1.684	2.223	1.701	-	1.701
Description: This program will develop ammunition logistics systems that improve munitions survivability and logistics					
FY 2020 Plans: Continued to integrate the munitions health monitoring system with additional ammunition items and conduct qualification tests. Continued to integrate passive time/temperature exposure sensor with ammunition items and conduct qualification testing.					
FY 2021 Base Plans: Continue to integrate passive time/temperature exposure sensor including exploring alternative technologies. Will continue to integrate the munitions health monitoring system with additional ammunition items including item specific form factors.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Decrease due to completion of qualification testing on munitions health monitoring system for Excalibur.					
Title: FY 2020 SBIR/STTR Transfer	-	0.106	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	1.684	2.329	1.701	-	1.701

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

N/A

Remarks

D. Acquisition Strategy

The acquisition strategy is to develop and test the Munitions Health Monitoring items and conduct a Technology Readiness Assessment (TRA) to ensure readiness for insertion into families of end items.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.106		-		-		-	0.000	0.106	-
Subtotal			-	-		0.106		-		-		-	0.000	0.106	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contractor	C/FFP	Karagozian & Case : Glendale, CA	0.534	1.165	Mar 2019	1.593	Dec 2019	0.801	Dec 2020	-		0.801	0.000	4.093	-
Contractor	C/FFP	Phase IV : Boulder, CO	-	0.460	Mar 2019	-		-		-		-	0.000	0.460	-
Contractor	C/FFP	InnoSense : Torrance, CA	-	-		-		0.300	Mar 2021	-		0.300	0.000	0.300	-
Subtotal			0.534	1.625		1.593		1.101		-		1.101	0.000	4.853	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Combat Capabilities Development Command, Armaments Center (CCDC, AC)	MIPR	Picatinny Arsenal : NJ	0.252	0.059	Dec 2018	0.365	Dec 2019	0.300	Dec 2020	-		0.300	0.000	0.976	-
Subtotal			0.252	0.059		0.365		0.300		-		0.300	0.000	0.976	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
System Development - Munitions Health Monitoring System (RR)																												
System Development - Low Cost Thermal Indicator																												
System Development - Plastic Cylindrical Container																												
System Development - Plastic Rectangular Container																												
System Development - Next Generation Temperature/Humidity Sensor																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
System Development - Munitions Health Monitoring System (RRAPDS)	2	2018	4	2023
System Development - Low Cost Thermal Indicator	1	2020	2	2023
System Development - Plastic Cylindrical Container	1	2022	4	2023
System Development - Plastic Rectangular Container	1	2022	4	2024
System Development - Next Generation Temperature/Humidity Sensor	1	2021	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP2 / Shoulder-Launched Munitions			
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
EP2: <i>Shoulder-Launched Munitions</i>	-	0.000	4.100	10.390	-	10.390	0.000	0.000	0.000	0.000	0.000	14.490
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Individual Assault Muniton (IAM) will be a lightweight Shoulder Launched Muniton (SLM) capability for combat units at the individual Soldier level. As an improvement over existing Shoulder Launched Munitions, the solution will fit within the Soldier Lethality Modernization Priority, by reducing Soldier load, while providing tactical innovation capable of extending overmatch against near-peer adversaries in a joint, multi-domain, high-intensity conflict. The IAM will allow Soldiers to conduct Urban Operations with an ability to defeat targets in an open space or in defilade at extended ranges. It will also allow Soldiers to defeat adversaries protected by field expedient structures and light armored vehicles. This solution will be effective day or night with the ability to safely engage targets from within enclosures using single hearing protection, increasing Soldier survivability. This solution will combine the capabilities of the existing Bunker Defeat Muniton (BDM) and the AT4 Confined Space - Reduced Sensitivity (AT4CS-RS), which will allow for reduced Soldier load and training complexity, as well as reducing the logistics burden for Light Infantry, Combat Engineers, and Special Operations Forces. Fiscal Year (FY) 2021 funding will provide the Army the opportunity to evaluate various developmental munitions to achieve emerging increased capability as an Individual Assault Muniton. The Individual Assault Muniton Capabilities Development Document (CDD) was approved on 11 March 2016.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Individual Assault Muniton (IAM)	-	3.914	10.390	-	10.390
Description: As an improvement over existing Shoulder Launched Munitions, IAM will fit within the Soldier Lethality Modernization Priority, by reducing Soldier load, while providing tactical innovation capable of extending overmatch against near-peer adversaries in a joint, multi-domain, high-intensity conflict. The IAM will allow Soldiers to conduct Urban Operations with an ability to defeat targets in an open space or in defilade at extended ranges. It will also allow Soldiers to defeat adversaries protected by field expedient structures and light armored vehicles. This solution will be effective day or night with the ability to safely engage targets from within enclosures using single hearing protection, increasing Soldier survivability. This solution will combine the capabilities of the existing BDM and the AT4CS-RS, which will allow for reduced Soldier load and training complexity, as well as reducing the logistics burden for Light Infantry, Combat Engineers, and Special Operations Forces.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP2 / Shoulder-Launched Munitions

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 funding supported the evaluation and development of system technology advancements to ensure the soldier has increased capabilities to engage targets at close ranges within enclosures.</p> <p>FY 2021 Base Plans: FY 2021 funding will continue to support the developmental shoulder-launched munition build and hardware testing to ensure the soldier has increased capabilities to engage targets at close and extended ranges, in the open, in defilade, behind field expedient structures.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding from FY 2020 to FY 2021 reflects additional requirements to support activities related to Engineering and Manufacturing Development and qualification testing.</p>					
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638</p>	-	0.186	-	-	-
Accomplishments/Planned Programs Subtotals	-	4.100	10.390	-	10.390

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

N/A

Remarks

D. Acquisition Strategy





The IAM acquisition strategy is to award multiple Other Transaction Authority (OTA) contracts to acquire test assets to evaluate performance against the IAM CDD. Upon successful IAM SLM testing, the winning candidate will enter Milestone C and be used for future procurement.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP2 / Shoulder-Launched Munitions							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.186		-		-		-	0.000	0.186	-
Subtotal			-	-		0.186		-		-		-	0.000	0.186	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Shoulder Launched Munitions (SLM) Development Contract	MIPR	Defense Ordnance Technology Consortium (DOTC) : Picatinny Arsenal, NJ	-	-		3.307	Mar 2020	8.690	Nov 2020	-		8.690	0.000	11.997	-
Subtotal			-	-		3.307		8.690		-		8.690	0.000	11.997	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	MIPR	Combat Capabilities Development Command, Armaments Center (CCDC, AC) : Picatinny Arsenal, NJ	-	-		0.607	Dec 2019	0.700	Oct 2020	-		0.700	0.000	1.307	-
Subtotal			-	-		0.607		0.700		-		0.700	0.000	1.307	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Evaluation Test	TBD	TBD : TBD	-	-		-		1.000	May 2021	-		1.000	0.000	1.000	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP2 / Shoulder-Launched Munitions

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Individual Assault Munition (IAM) Milestone B																												
Engineering, Manufacturing and Development Contract																												
Test and Evaluation																												
Milestone C / Type Classification Decision																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP2 / <i>Shoulder-Launched Munitions</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Individual Assault Munition (IAM) Milestone B	2	2020	2	2020
Engineering, Manufacturing and Development Contract	2	2020	4	2021
Test and Evaluation	3	2021	4	2021
Milestone C / Type Classification Decision	4	2021	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber			
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
EP3: <i>Reduced Range Ammunition - Small Caliber</i>	-	4.432	8.376	15.377	-	15.377	14.873	5.095	0.000	0.000	0.000	48.153
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The small caliber Reduced Range Ammunition (RRA) Project is a critical technology development in response to the 7.62 millimeter (mm) and .50 caliber Capabilities Development Documents (CDD). The overall objective of RRA is to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. The relatively long maximum range of the 7.62mm and .50 caliber service ammunition poses challenges on training ranges in range restricted areas. RRA will mitigate a training gap on installations by providing a materiel solution that meets training needs while shortening and condensing the SDZ. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted ranges. The RRA cartridge design will be compatible with all Army 7.62mm and .50 caliber weapons, but specifically optimized to work in the M240 and M2 Machine Guns. Fiscal Year (FY) 2021 funding supports continuing Engineering and Manufacturing Development (EMD) efforts, performing a Technical Readiness Review (TRR), conducting Production Qualification Testing (PQT), and performing activities to prepare for ammunition production transition to the Lake City Army Ammunition Plant (LCAAP) on the 7.62mm variant. FY 2021 also includes continuing the EMD effort, conducting a Critical Design Review (CDR), performing a User Evaluation / Soldier Touch Point (STP), and performing PQT on the 50 caliber variant. FY 2021 includes continuing activities to evaluate RRA ammunition prototypes and designs for the Next Generation Squad Weapon (NGSW) systems.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Engineering and Manufacturing Development 7.62mm	4.432	3.374	7.200	-	7.200
Description: EMD Activities for 7.62mm Reduced Range Ammunition.					
FY 2020 Plans: Continued EMD efforts and performed 7.62mm RRA design review and qualification testing.					
FY 2021 Base Plans: Continue EMD efforts, perform a TRR, conduct PQT, and perform activities to prepare for transition to the LCAAP.					
FY 2020 to FY 2021 Increase/Decrease Statement: Planned increase to procure test quantities in preparation for PQT.					
Title: Engineering and Manufacturing Development .50 Caliber	-	4.549	8.000	-	8.000
Description: EMD Activities for .50 Cal Reduced Range Ammunition.					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: Continued Engineering, EMD efforts and perform .50 Cal RRA PDR and qualification testing.</p> <p>FY 2021 Base Plans: Continue the EMD effort, conduct a CDR, perform a User Evaluation / STP, and performing PQT.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Planned increase to procure test quantities from 3 vendors in preparation for PQT.</p>					
<p>Title: Next Generation Squad Weapon (NGSW) Reduced Range Technology Evaluation</p> <p>Description: Concept development/evaluation of RRA ammunition for the Next Generation Squad Weapons (NGSW).</p> <p>FY 2020 Plans: Explored / evaluated RRA concepts for the NGSW.</p> <p>FY 2021 Base Plans: Evaluate RRA ammunition prototypes and designs for the NGSW.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease is due to planned RRA activities for the NGSW occurring in FY 2021.</p>	-	0.073	0.177	-	0.177
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638</p>	-	0.380	-	-	-
Accomplishments/Planned Programs Subtotals	4.432	8.376	15.377	-	15.377

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• EL7: Reduced Range Ammunition	2.090	-	0.000	-	0.000	-	-	-	-	0.000	2.090

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

Budget Activity 5 Program Element 0604802A Weapons and Munitions - Eng Dev Project EP3, Reduced Range Ammunition transitioned from Budget Activity 4 PE 0603639A Tank and Medium Caliber Ammunition Project EL7 Reduced Range Ammunition in FY 2019 for the 7.62mm variant. The .50 Caliber variant transitions in FY 2020.

D. Acquisition Strategy

After 7.62mm Milestone (MS) B in FY 2019, the Government intends to award Engineering and Manufacturing Development (EMD) contracts. The Government will then award competitive contracts for 7.62mm Pre-Production Qualification Testing (PPQT) hardware in FY 2020 and down-select to a single contractor to complete EMD. The .50 Caliber program follows a similar strategy. The Government intends to award multiple competitive contracts for the .50 Caliber EMD.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP3 / Reduced Range Ammunition - Small Caliber							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.380		-		-		-	0.000	0.380	-
Subtotal			-	-		0.380		-		-		-	0.000	0.380	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Contract 7.62mm EMD # 1	Option/CPFF	General Dynamics : Florham Park, NJ	-	0.900	Sep 2019	0.770	Feb 2020	-		-		-	Continuing	Continuing	Continuing
Development Contract 7.62mm EMD # 2	Option/CPFF	Nammo Tally : Mesa, Arizona	-	0.750	Sep 2019	0.715	Feb 2020	-		-		-	Continuing	Continuing	Continuing
Development Contract 7.62mm EMD Down-Select	Option/CPFF	To Be Determined : To Be Determined	-	-		-		2.000	Jan 2021	-		2.000	Continuing	Continuing	Continuing
Development Contract 7.62mm Transition to Lake City Army Ammunition Plant (LCAAP)	Option/CPFF	OLIN Winchester Corporation : Lake City, Missouri	-	-		-		1.000	Jan 2021	-		1.000	0.000	1.000	-
Development Contract 7.62mm Tracer Manufacturing	Option/CPFF	OLIN Winchester Corporation : Lake City, Missouri	-	-		-		1.000	Jan 2021	-		1.000	0.000	1.000	-
Development Contract .50 Cal Contractor 1	C/CPFF	American Ordnance : Middletown, IA	-	-		0.765	Apr 2020	1.350	Jan 2021	-		1.350	Continuing	Continuing	Continuing
Development Contract .50 Cal Contractor 2	Option/CPFF	General Dynamics : Florham Park, NJ	-	-		0.815	Feb 2020	1.800	Jan 2021	-		1.800	Continuing	Continuing	Continuing
Development Contract .50 Cal Contractor 3	Option/CPFF	Nammo Tally : Mesa, Arizona	-	-		0.815	Feb 2020	1.800	Jan 2021	-		1.800	Continuing	Continuing	Continuing
Next Generation Squad Weapon Reduce Range Ammunition (NGSW RRA) Concept Evaluation	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) :	-	-		0.165	Oct 2019	-		-		-	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP3 / Reduced Range Ammunition - Small Caliber								
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
		Picatinny Arsenal, New Jersey														
Prototype Development	Option/CPAF	Booz Allen Hamilton : Dover, NJ	-	0.309	Nov 2018	0.215	Feb 2020	-		-		-	0.000	0.524	-	
Subtotal			-	1.959		4.260		8.950		-		8.950	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Combat Capabilities Development Command, Armaments Center (CCDC AC) 7.62mm	MIPR	Picatinny Arsenal : New Jersey	-	1.759	Oct 2018	0.965	Oct 2019	1.500	Oct 2020	-		1.500	Continuing	Continuing	Continuing	
Combat Capabilities Development Command, Armaments Center (CCDC AC) .50 Cal	MIPR	Picatinny Arsenal : New Jersey	-	-		1.715	Oct 2019	1.000	Oct 2020	-		1.000	Continuing	Continuing	Continuing	
Combat Capabilities Development Command, Armaments Center (CCDC AC) NGSW	MIPR	Picatinny Arsenal : New Jersey	-	0.232	Oct 2018	-		0.177	Oct 2020	-		0.177	Continuing	Continuing	Continuing	
Subtotal			-	1.991		2.680		2.677		-		2.677	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Design Verification Test (DVT 7.62mm)	MIPR	U.S. Army Test Center : Yuma, Arizona	-	0.482	Dec 2018	-		-		-		-	0.000	0.482	-	

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
7.62mm Milestone B (MS B)	1																											
7.62mm Transitions from BA04 EL7 to BA05 EP3	2																											
7.62mm Engineering and Manufacturing Development (EMD)																												
7.62mm Preliminary Design Review (PDR)				3																								
7.62mm Pre-Production Qualification Test (PPQT)																												
7.62mm Developmental Test and Evaluation (DT&E)																												
7.62mm Critical Design Review (CDR)																												
7.62mm Production Qualification Test (PQT)																												
7.62mm Milestone C (MS C)																												
.50 Caliber Multiple Concept Design Evaluations																												
.50 Caliber Design Verification Test (DVT)																												
.50 Caliber Milestone B (MS B)																												
.50 Caliber Transitions from BA04 EL7 to BA05 EP3																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
.50 Caliber Engineering and Manufacturing Development (EMD)					.50 Cal EMD																							
.50 Caliber Preliminary Design Review (PDR)									6 .50 Cal PDR																			
.50 Caliber Pre-Production Qualification Test (PPQT)									.50 Cal PPQT																			
.50 Caliber Soldier Touch Point (STP)									.50 Cal STP																			
.50 Caliber Critical Design Review (CDR)									8 .50 Cal CDR																			
.50 Caliber Production Qualification Test (PQT)													.50 Cal PQT															
.50 Caliber Milestone C (MS C)																	10 .50 Cal MS C											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP3 / <i>Reduced Range Ammunition - Small Caliber</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Multiple Concept Design Evaluations	1	2017	4	2018
7.62mm Materiel Development Decision (MDD)	4	2017	4	2017
7.62mm Design Verification Test (DVT)	2	2018	3	2018
7.62mm Milestone B (MS B)	1	2019	1	2019
7.62mm Transitions from BA04 EL7 to BA05 EP3	1	2019	1	2019
7.62mm Engineering and Manufacturing Development (EMD)	1	2019	2	2022
7.62mm Preliminary Design Review (PDR)	4	2019	4	2019
7.62mm Pre-Production Qualification Test (PPQT)	2	2020	1	2021
7.62mm Developmental Test and Evaluation (DT&E)	4	2020	1	2021
7.62mm Critical Design Review (CDR)	2	2021	2	2021
7.62mm Production Qualification Test (PQT)	4	2021	2	2022
7.62mm Milestone C (MS C)	2	2022	2	2022
.50 Caliber Project Starts on BA04 EL7	1	2018	1	2018
.50 Caliber Multiple Concept Design Evaluations	1	2018	1	2020
.50 Caliber Materiel Development Decision (MDD)	2	2018	2	2018
.50 Caliber Design Verification Test (DVT)	2	2019	3	2019
.50 Caliber Milestone B (MS B)	1	2020	1	2020
.50 Caliber Transitions from BA04 EL7 to BA05 EP3	1	2020	1	2020
.50 Caliber Engineering and Manufacturing Development (EMD)	1	2020	2	2023
.50 Caliber Preliminary Design Review (PDR)	4	2020	4	2020
.50 Caliber Pre-Production Qualification Test (PPQT)	4	2020	2	2021
.50 Caliber Soldier Touch Point (STP)	2	2021	3	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber
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Events	Start		End	
	Quarter	Year	Quarter	Year
.50 Caliber Critical Design Review (CDR)	4	2021	4	2021
.50 Caliber Production Qualification Test (PQT)	1	2022	3	2022
.50 Caliber Milestone C (MS C)	2	2023	2	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo			
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
EP4: One-Way Luminescence for Small Caliber Ammo	-	5.855	8.547	13.977	-	13.977	6.981	7.393	2.998	0.000	0.000	45.751
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 Caliber Munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL projects objective is to develop and field a full tracer round, replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability, and increasing lethality by incorporating Enhanced Performance Round (EPR) technology into the new tracer ammunition. 7.62mm and 5.56mm are the immediate focus; later followed by .50 Caliber cartridges and Next Generation Squad Weapons (NGSW) ammunition. Fiscal Year (FY) 2021 funding will support continuing Engineering and Manufacturing Development (EMD) efforts, performing Production Qualification Testing (PQT), performing Safety Release Tests, conducting Live-Fire Testing and Evaluation (LFT&E), conducting a Critical Design Review (CDR), conducting a Limited User Evaluation (LUE), and performing preparation activities for manufacturing at the Lake City Army Ammunition Plant (LCAAP) for the 7.62mm variant. FY 2021 funding will also support EMD efforts, Design Verification Tests (DVT), and preparation for the Preliminary Design Review (PDR) for the 5.56mm variant. FY 2021 also supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NGSW.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: EMD 7.62mm	5.855	8.153	7.200	-	7.200
Description: EMD efforts for the 7.62mm variant followed by OWL tracer solutions for .50 Caliber weapons.					
FY 2020 Plans: Continued EMD efforts, performed Pre-Production Qualification Testing (PPQT), performed development tests, and a User Assessment (UA) for the 7.62mm OWL ammunition.					
FY 2021 Base Plans: Continuing EMD efforts, perform PQT, perform Safety Release Tests, conduct LFT&E, conduct a Critical Design review (CDR), conduct a Limited User Evaluation (LUE), and perform preparation activities for manufacturing at the LCAAP.					
FY 2020 to FY 2021 Increase/Decrease Statement: Planned EMD activities for the 7.62mm OWL in FY 2021.					
Title: Prototype and Concept Evaluation for NGSW and .50 Caliber Ammunition	-	0.006	0.177	-	0.177

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020			
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo				
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NGSW.						
FY 2020 Plans: Evaluated OWL prototypes/concepts ammunition for the NGSW. Assessed OWL technologies for potential to adapt the technology into the NGSW ammunition. Evaluated OWL prototypes/concepts ammunition for .50 Caliber Weapons.						
FY 2021 Base Plans: Will continue to assess OWL technologies for potential to adapt the technology into the NGSW ammunition.						
FY 2020 to FY 2021 Increase/Decrease Statement: Planned ammunition concept evaluation efforts for the .50 Caliber weapons and the NGSW in FY 2021.						
Title: EMD 5.56mm		-	-	6.600	-	6.600
Description: EMD efforts for the 5.56mm variants.						
FY 2021 Base Plans: Start EMD efforts, perform DVT, and begin preparation for the PDR.						
FY 2020 to FY 2021 Increase/Decrease Statement: The 5.56mm variant transitions from Budget Activity (BA) 4 Program Element (PE) 0603639A Tank and Medium Caliber Ammunition to BA5 PE 0604802A Weapons and Munitions - Eng Dev in FY 2021.						
Title: FY 2020 SBIR/STTR Transfer		-	0.388	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638						
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638						
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638						
Accomplishments/Planned Programs Subtotals		5.855	8.547	13.977	-	13.977

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EB8: OWL for Small Caliber Ammunition	1.984	2.000	0.000	-	0.000	-	-	-	-	0.000	3.984

Remarks

OWL is a new tracer technology that will be applied to multiple calibers. The initial focus was on 7.62mm ammunition in FY 2015 followed by 5.56mm in FY 2018; and later followed by the .50 Caliber and NGSW ammunition. As the technology matured the effort transitioned from BA4 PE 0603639A Tank and Medium Caliber Ammunition Project EB8 One Way Luminescence (OWL) to BA5 PE 0604802A One-Way Luminescence for Small Caliber Ammo Project EP4 One Way Luminescence (OWL) for Small Caliber Ammunition in FY 2019 for 7.62mm, and FY 2021 for 5.56mm. The OWL cartridge will be compatible with all Army Small Caliber weapon systems, but optimized for Machine Guns and will provide improved lethality / target effects over the current tracer munition.

D. Acquisition Strategy

The OWL concept will be developed through Government and Industry prototyping efforts. Technology Readiness Assessments (TRAs) were conducted in FY 2017 and FY 2018 to evaluate the industry and Government concepts in order to proceed with the 7.62mm EMD. The 5.56mm, NGSW, and .50 Caliber cartridges will follow the 7.62mm schedule with EMD starting in FY 2021 for the 5.56mm variant. The new tracer cartridges will replace legacy tracers in each of the various small caliber configurations.

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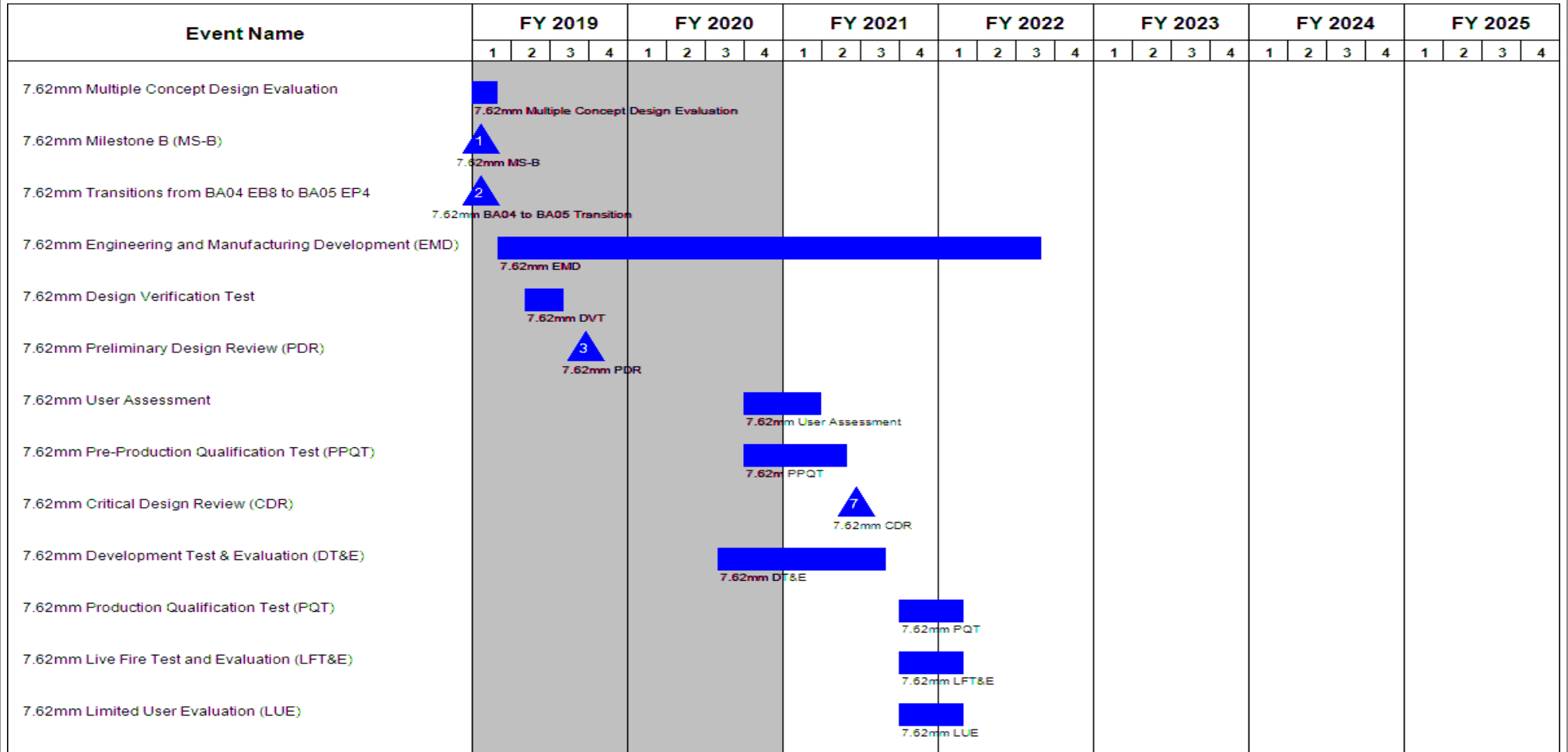
Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP4 / One-Way Luminescence for Small Caliber Ammo							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.388		-		-		-	0.000	0.388	-
Subtotal			-	-		0.388		-		-		-	0.000	0.388	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	-	0.014	Oct 2018	0.027	Oct 2019	0.015	Oct 2020	-		0.015	Continuing	Continuing	Continuing
EMD Contractor # 1 (7.62mm)	Option/CPFF	General Dynamics : Florham Park, NJ	-	1.000	Jan 2019	2.022	Jan 2020	-		-		-	0.000	3.022	-
EMD Contractor # 2 (7.62mm)	Option/CPFF	Nammo Tally : Mesa, AZ	-	1.082	Jan 2019	2.022	Jan 2020	-		-		-	0.000	3.104	-
Down-Selected EMD Contractor (7.62mm)	Option/CPFF	To be determined : To be determined	-	-		-		2.579	Oct 2020	-		2.579	Continuing	Continuing	Continuing
OWL Manufacturing Tooling Development (7.62mm)	Option/CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	1.244	Nov 2018	-		0.200	Oct 2020	-		0.200	Continuing	Continuing	Continuing
Lake City Army Ammunition Plant Tech Integration	TBD	To be determined : Lake City, MO	-	-		-		0.700	Oct 2020	-		0.700	Continuing	Continuing	Continuing
EMD Contractor # 1 (5.56mm)	C/CPFF	To be determined : To be determined	-	-		-		1.990	Oct 2020	-		1.990	Continuing	Continuing	Continuing
EMD Contractor # 2 (5.56mm)	C/CPFF	To be determined : To be determined	-	-		-		1.990	Oct 2020	-		1.990	Continuing	Continuing	Continuing
OWL Manufacturing Tooling Development (5.56mm)	Option/CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	-		-		0.265	Oct 2020	-		0.265	0.000	0.265	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP4 / One-Way Luminescence for Small Caliber Ammo							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	3.340		4.071		7.739		-		7.739	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
CCDC Armaments Center (CCDC-AC) 7.62mm	MIPR	Picatinny Arsenal : New Jersey	-	1.739	Oct 2018	1.994	Oct 2019	2.756	Oct 2020	-		2.756	Continuing	Continuing	Continuing
Product Development Support (7.62mm)	Option/FFP	Leidos Inc. : Reston, VA	-	0.068	Mar 2019	-		-		-		-	0.000	0.068	-
CCDC Armaments Center (CCDC-AC) 5.56mm	MIPR	Picatinny Arsenal : New Jersey	-	-		-		1.905	Oct 2020	-		1.905	0.000	1.905	-
Safety Release Support (5.56mm)	MIPR	To be determined : To be determined	-	-		-		0.200	Oct 2020	-		0.200	0.000	0.200	-
OWL Solutions/Evaluation for NGSW	MIPR	CCDC Armaments Center : Picatinny Arsenal	-	-		-		0.177	Oct 2020	-		0.177	Continuing	Continuing	Continuing
Subtotal			-	1.807		1.994		5.038		-		5.038	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
U.S. Army Aberdeen Test Center (ATC) 7.62mm	MIPR	Aberdeen Proving Ground : Maryland	-	0.060	Oct 2018	1.172	Oct 2019	0.500	Oct 2020	-		0.500	Continuing	Continuing	Continuing
Independent Testing (7.62mm)	MIPR	Joint Munitions Command/ Bullet Suupy Organization : Lake City, MO	-	0.035	Oct 2018	-		-		-		-	0.000	0.035	-

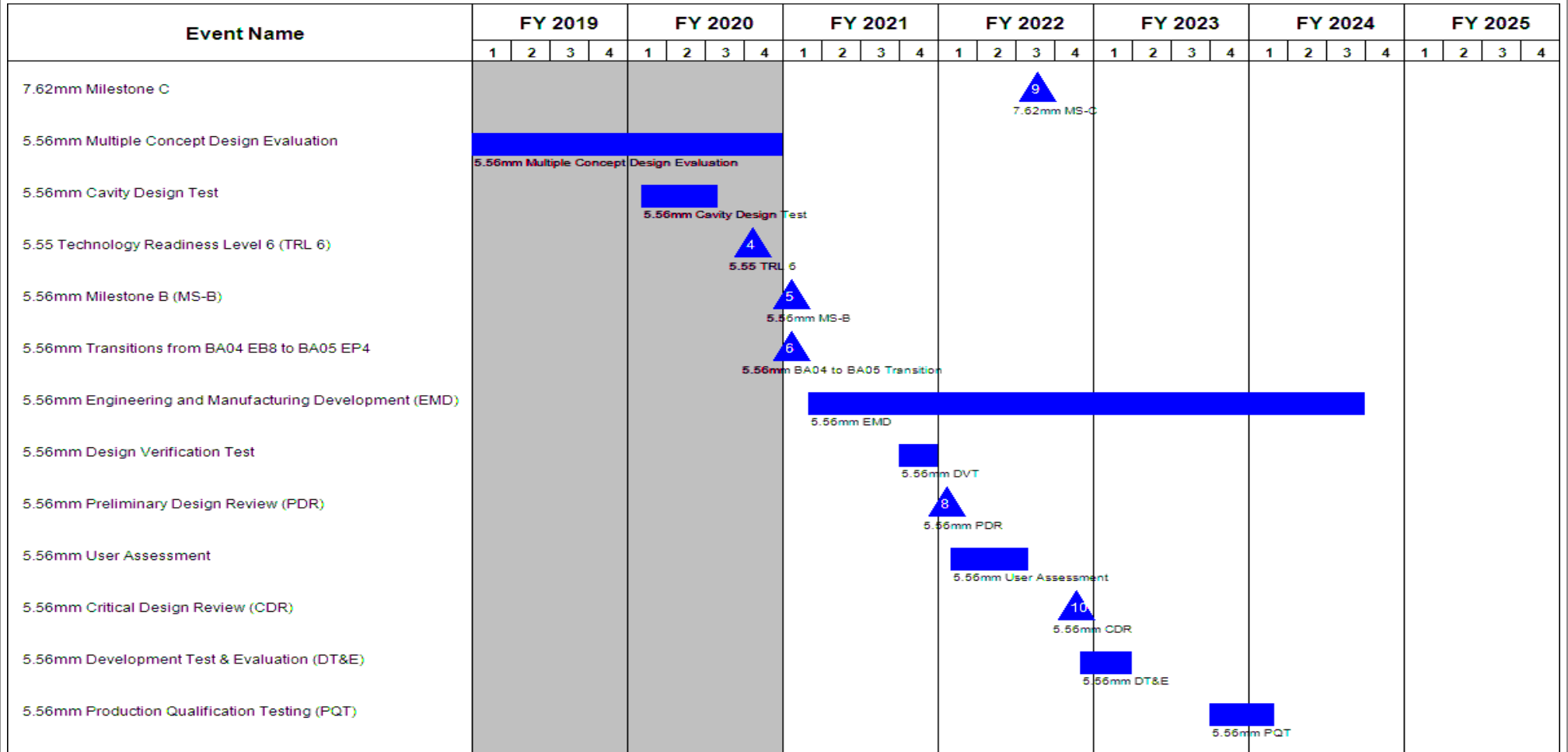
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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo






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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP4 / <i>One-Way Luminescence for Small Caliber Ammo</i>	



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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
5.56mm Live-Fire Test and Evaluation (LFT&E)																					 5.56mm LFT&E							
5.56mm Milestone C (MS-C)																					 5.56mm MS-C							
Next Generation Squad Weapon (NGSW) & .50 caliber Concept Design Evaluation																					 NGSW & .50 caliber Concept Design Evaluation							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP4 / <i>One-Way Luminescence for Small Caliber Ammo</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Materiel Development Decision (MDD)	4	2016	4	2016
7.62mm Multiple Concept Design Evaluation	1	2015	1	2019
7.62mm Milestone B (MS-B)	1	2019	1	2019
7.62mm Transitions from BA04 EB8 to BA05 EP4	1	2019	1	2019
7.62mm Engineering and Manufacturing Development (EMD)	1	2019	3	2022
7.62mm Design Verification Test	2	2019	3	2019
7.62mm Preliminary Design Review (PDR)	3	2019	3	2019
7.62mm User Assessment	4	2020	1	2021
7.62mm Pre-Production Qualification Test (PPQT)	4	2020	2	2021
7.62mm Critical Design Review (CDR)	2	2021	2	2021
7.62mm Development Test & Evaluation (DT&E)	3	2020	3	2021
7.62mm Production Qualification Test (PQT)	4	2021	1	2022
7.62mm Live Fire Test and Evaluation (LFT&E)	4	2021	1	2022
7.62mm Limited User Evaluation (LUE)	4	2021	1	2022
7.62mm Milestone C	3	2022	3	2022
5.56mm Materiel Development Decision (MDD)	3	2018	3	2018
5.56mm Project Starts on BA04 EB8	3	2018	3	2018
5.56mm Multiple Concept Design Evaluation	4	2018	4	2020
5.56mm Cavity Design Test	1	2020	3	2020
5.55 Technology Readiness Level 6 (TRL 6)	4	2020	4	2020
5.56mm Milestone B (MS-B)	1	2021	1	2021
5.56mm Transitions from BA04 EB8 to BA05 EP4	1	2021	1	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo
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Events	Start		End	
	Quarter	Year	Quarter	Year
5.56mm Engineering and Manufacturing Development (EMD)	1	2021	3	2024
5.56mm Design Verification Test	4	2021	4	2021
5.56mm Preliminary Design Review (PDR)	1	2022	1	2022
5.56mm User Assessment	1	2022	3	2022
5.56mm Critical Design Review (CDR)	4	2022	4	2022
5.56mm Development Test & Evaluation (DT&E)	4	2022	1	2023
5.56mm Production Qualification Testing (PQT)	4	2023	1	2024
5.56mm Live-Fire Test and Evaluation (LFT&E)	4	2023	1	2024
5.56mm Milestone C (MS-C)	4	2024	4	2024
Next Generation Squad Weapon (NGSW) & .50 caliber Concept Design Evaluation	1	2020	2	2021

Note

As the technology matures, the One Way Luminescence (OWL) projects transitions from BA4 PE 0603639A Tank and Medium Caliber Ammunition Project EB8 One Way Luminescence (OWL) to BA5 PE 0604802A One-Way Luminescence for Small Caliber Ammo Project EP4 One Way Luminescence (OWL) for Small Caliber Ammunition

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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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
EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	-	20.247	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.247
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Family of Ammunition Capabilities Development Documents (CDD). The nomenclature for the 7.62mm ADVAP is XM1158. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm. The ADVAP ammunition in calibers below 7.62mm for the Next Generation Squad Weapons (NGSW) is referred to as the Special Purpose ammunition. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.

NGSW Family of Ammunition: The NGSW ammo is a new ammunition technology under development for use in the Next Generation Squad Weapon systems. The objective is to develop and FMR the new ammunition. No funding requested in Fiscal Year (FY) 2021 on Army Program Element (PE) 0604802A / Project EP5.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 7.62mm Engineering & Manufacturing Development (EMD)	11.978	-	-	-	-
Description: Develop, demonstrate, and qualify XM1158 Small Caliber Ammunition 7.62mm ADVAP cartridges in order to defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.					
Title: NGSW Rapid Prototyping and Development	8.269	-	-	-	-
Description: Develop, demonstrate, and qualify new ammunition for the NGSW systems.					
Accomplishments/Planned Programs Subtotals	20.247	-	-	-	-

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	5.334	6.821	0.000	-	0.000	-	-	-	-	0.000	12.155

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• F57510: CTG, 7.62mm <i>Advanced Armor Piercing, XM1158</i>	20.700	21.013	22.960	-	22.960	25.656	25.666	-	-	0.000	115.995
• FL4: <i>Small Caliber Ammo for Next Gen Squad Weapons</i>	-	18.180	30.600	-	30.600	28.723	24.976	11.739	11.858	0.000	126.076

Remarks

Budget Activity 4 PE 0603639A, Project EC2-RDTE/Adv Armor-Piercing (ADVAP) for Small Cal Ammo: This funding line started the development, technology maturation, and Pre-Engineering & Manufacturing Development (Pre-EMD) work on 7.62mm ADVAP cartridges and initiates rapid prototyping work on the Special Purpose (SP)/ADVAP ammunition in calibers below 7.62mm.

Procurement of Ammunition, Army F57510-AMMO/CTG, 7.62mm Advanced Armor Piercing, XM1158: This funding line supports the procurement of 7.62mm XM1158 Advanced Armor-Piercing (ADVAP) Ball Cartridges 4Ball/1 M62A1 Tracer linked Cartridges.

Budget Activity 5 PE 0604802A, Project FL4-RDTE/Small Caliber Ammo for Next Gen Squad Weapons: This funding line continues rapid development/prototyping work on the Next Gen General Purpose (GP) ammunition and Special Purpose (SP) ammunition.

D. Acquisition Strategy

Advanced Armor-Piercing (ADVAP): The ADVAP ammunition programs will use a Government developed design and manufacturing processes. Multiple component contracts will be awarded to purchase raw materials and equipment. In FY 2017, the 7.62mm variant, achieved Milestone B; completed Production Decision Review (PDR), and Integrated Baseline Review (IBR) leading to the establishment of the Performance Measurement Baseline and the approval to begin manufacturing the Pre-Production Qualification Testing (PPQT) sample.

Next Generation Squad Weapon (NGSW) Family of Ammunition: The Next Generation Squad Weapon (NGSW) ammunition program will utilize the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding to develop ammunition concepts/designs for the General Purpose (GP) variant and the Special Purpose (SP) variant. Contractors will be funded to rapidly develop projectile designs/concepts with a final down-select to one design prior to Urgent Material Release (UMR) in FY 2022. Follow-on development efforts for additional NGSW ammunition variants including tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition will start in FY 2022.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Armor-Piercing (ADVAP) Raw Materials	Various	Various : New Jersey	5.008	1.066	Jan 2019	-		-		-		-	0.000	6.074	-
Next Generation Squad Weapon (NGSW) Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	-	0.005	Oct 2018	-		-		-		-	0.000	0.005	-
Next Generation Squad Weapon (NGSW) Rapid Prototyping Projectile Development	C/CPFF	Northrop Grumman Innovation Systems : Independence, Missouri	-	3.800	Jan 2019	-		-		-		-	0.000	3.800	-
Next Generation Squad Weapon (NGSW) Development Contractor # 1	C/CPFF	Textron Systems : Hunt Valley, Maryland	-	2.375	Sep 2019	-		-		-		-	0.000	2.375	-
Next Generation Squad Weapon (NGSW) Development Contractor # 2	C/CPFF	Sig Sauer : Newington, New Hampshire	-	0.075	Sep 2019	-		-		-		-	0.000	0.075	-
Next Generation Squad Weapon (NGSW) Development Contractor # 3	C/CPFF	General Dynamics : Florham Park, New Jersey	-	1.800	Sep 2019	-		-		-		-	0.000	1.800	-
Subtotal			5.008	9.121		-		-		-		-	0.000	14.129	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Armor-Piercing (ADVAP) CCDC Armaments Center Support	MIPR	Combat Capabilities Development Command, Armaments Center (CCDC, AC) :	10.128	5.802	Oct 2018	-		-		-		-	0.000	15.930	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo							
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
		Picatinny Arsenal, New Jersey													
Advanced Armor-Piercing (ADVAP) Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	2.816	1.536	Oct 2018	-		-		-		-	0.000	4.352	-
Advanced Armor-Piercing (ADVAP) Manufacturing Support	C/FP	UTRS : New Jersey	1.930	0.568	Apr 2019	-		-		-		-	0.000	2.498	-
Advanced Armor-Piercing (ADVAP) De-mil Evaluation Support	MIPR	Tooele Army Depot : Tooele, Utah	-	0.197	Oct 2018	-		-		-		-	0.000	0.197	-
Next Generation Squad Weapon (NGSW) CCDC Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command, Armaments Center (CCDC, AC) : Picatinny Arsenal, New Jersey	-	0.214	Oct 2018	-		-		-		-	0.000	0.214	-
Subtotal			14.874	8.317		-		-		-		-	0.000	23.191	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Armor-Piercing (ADVAP) U.S. Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	0.503	0.559	Oct 2018	-		-		-		-	0.000	1.062	-
Advanced Armor-Piercing (ADVAP) Testing CCDC Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) :	1.200	0.650	Oct 2018	-		-		-		-	0.000	1.850	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NGSW Ammo Prototype Test 1																												
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose																												
NGSW Ammo Critical Design Review Special Purpose (CDR-SF)																												
NGSW Ammo Prototype Test 2																												
NGSW Ammo Safety Testing SP																												
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)																												
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)																												
NGSW Ammo Rapid Fielding																												
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)																												
NGSW Ammo Full Materiel Release (FMR)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP5 / <i>Adv Armor-Piercing (ADVAP) for Small Caliber Ammo</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ADVAP 7.62mm Advanced Concept Development	1	2015	1	2017
ADVAP 7.62mm Prototype Test & Evaluation	1	2015	1	2017
7.62mm Materiel Development Decision (MDD)	4	2015	4	2015
ADVAP 7.62mm Milestone B	1	2017	1	2017
ADVAP 7.62mm Engineering & Manufacturing Development	2	2017	4	2019
ADVAP 7.62mm Preliminary Design Review (PDR)	2	2017	2	2017
ADVAP 7.62mm Pre-Production Qualification Testing (PPQT)	1	2018	1	2018
ADVAP 7.62mm Critical Design Review (CDR)	2	2018	2	2018
ADVAP 7.62mm Development Test & Evaluation	1	2019	3	2019
ADVAP 7.62mm Urgent Materiel Release (UMR)	2	2019	2	2019
ADVAP 7.62mm Milestone C	4	2019	4	2019
ADVAP 7.62mm Type Classification (TC)	4	2019	4	2019
ADVAP 7.62mm Full Materiel Release (FMR)	2	2020	2	2020
NGSW Ammo Rapid Prototyping	1	2019	2	2024
NGSW Ammo Initial Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019
NGSW Ammo Preliminary Design Review General Purpose (PDR-GP)	3	2019	3	2019
NGSW Ammo Initial Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
NGSW Ammo Project BA05 EP5 to Project BA05 FL4 Transition	1	2020	1	2020
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)	2	2020	2	2020
NGSW Ammo Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
NGSW Ammo Prototype Test 1	3	2020	4	2020
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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Events	Start		End	
	Quarter	Year	Quarter	Year
NGSW Ammo Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
NGSW Ammo Prototype Test 2	2	2021	3	2021
NGSW Ammo Safety Testing SP	1	2022	3	2022
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
NGSW Ammo Rapid Fielding	4	2022	1	2026
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)	1	2023	2	2023
NGSW Ammo Full Materiel Release (FMR)	2	2024	2	2024

Note

Notes:
Advanced Armor-Piercing (ADVAP)
Next Generation Squad Weapon (NGSW)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures			
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
EP7: Aviation Airborne Expendable Countermeasures	-	0.000	4.920	4.476	-	4.476	8.241	0.000	0.000	0.000	0.000	17.637
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Aviation Airborne Expendable Countermeasures (AAECM) will support Integrated System Design (ISD), System Capability (SC) and Manufacturing Process Demonstrations (MPD) on current pyrotechnic munitions and tunable pyrotechnic aircraft countermeasures and decoys to include the XM215 Flare and Radio Frequency (RF) expendables. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army Research Development Technology & Evaluation (RDT&E) efforts are coordinated with Program Executive Office (PEO) Aviation to address the AAECM capability, a critical enabler for the Future Vertical Lift (FVL) - Aircraft Survivability Equipment (ASE) Cross Functional Team (CFT) within Army's Top modernization priorities.

These advanced decoys will address deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. The project will also support ISD, SC and MPD on new expendable countermeasure munitions that will protect Army aircraft from advanced and current guided missile threats. Activities include modeling and simulation, flight testing, qualification testing, environmental considerations, safety enhancements, manufacturing enhancements, qualification of other service and foreign munitions that could meet current requirements, product improvements, insertion of new technologies to increase performance, and enhancement of current flare solutions for new and existing aircraft. Systems include impulse cartridges and aircraft expendables (to include RF expendables). Fiscal Year (FY) 2021 will support continued modeling and simulation and developmental testing for RF countermeasures and verification testing for the XM215 design.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Improvements to countermeasure flares	-	4.697	4.476	-	4.476
Description: This program will develop improvements to legacy countermeasure flare solutions and qualify them for Army use.					
FY 2020 Plans: Continued data analysis and evaluation of prototypes and flight effectiveness testing on Army platforms based on modeling and simulation (M&S) results. Down select potential solutions to transition to the Engineering and Manufacturing Development (EMD) Phase for XM215 and RF Passive countermeasure solutions.					
FY 2021 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue M&S of RF Passive countermeasure solutions, build prototypes, and conduct Developmental Test and Evaluation (DT&E). Refine XM215 design, conduct design verification and flight testing. FY 2020 to FY 2021 Increase/Decrease Statement: Funding change from FY 2020 to FY 2021 reflects decrease in prototype development as potential solutions are refined. Final prototypes will be identified and refined resulting in lower product development costs, which is reflected in the decreased FY 2021 funding.					
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC 638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638	-	0.223	-	-	-
Accomplishments/Planned Programs Subtotals	-	4.920	4.476	-	4.476

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• EB9: Aviation Airborne Expendable Countermeasures	5.004	3.186	4.496	-	4.496	6.054	-	-	-	0.000	18.740

Remarks

D. Acquisition Strategy
A Technical Development Strategy (TDS) for the development and production of Flare, Aircraft: Countermeasure XM215 and RF Decoys under the AAECM program for the United States (U.S.) Army will be used. Prototyping contracts will be awarded competitively under the Department of Defense (DoD) Ordnance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) contract mechanism. Following Milestone B, EMD activities will include continued design development, flight testing, design verification review, and developmental and operational testing ahead of Milestone C.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP7 / Aviation Airborne Expendable Countermeasures							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.223		-		-		-	0.000	0.223	-
Subtotal			-	-		0.223		-		-		-	0.000	0.223	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
XM215 Development	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	-	-		2.515	Jan 2020	0.750	Oct 2020	-		0.750	0.000	3.265	-
RF Development	C/FFP	DOTC : PICATINNY ARSENAL	-	-		-		0.500	Oct 2020	-		0.500	0.000	0.500	-
Subtotal			-	-		2.515		1.250		-		1.250	0.000	3.765	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
XM215 Engineering Support	MIPR	CCDC : Picatinny Arsenal	-	-		0.744	Dec 2019	0.741	Dec 2020	-		0.741	0.000	1.485	-
RF Engineering Support	MIPR	CCDC : Picatinny Arsenal	-	-		0.194	Dec 2019	0.782	Dec 2020	-		0.782	0.000	0.976	-
Subtotal			-	-		0.938		1.523		-		1.523	0.000	2.461	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
XM215 Flight Testing	MIPR	AED : Redstone Arsenal, AL	-	-		1.244	Jun 2020	1.403	Oct 2020	-		1.403	0.000	2.647	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
XM215 Development																												
XM215 Milestone A																												
XM215 Prototyping																												
XM215 Down Select																												
XM215 Testing Efforts (Stability/Heat/Cold)																												
XM215 Flight Testing																												
XM215 Milestone B																												
XM215 Development Contract																												
XM215 Design Verification Test																												
XM215 Flight Test																												
XM215 Developmental and Operational Testing																												
XM215 Milestone C																												
RFCM Development																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RFCM Milestone A	2																											
	RFCM MS-A																											
RFCM Prototype Development																												
RFCM Demonstrations																												
RFCM Flight Testing 1																												
RFCM Data Analysis																												
RFCM Milestone B																												
RFCM Development Contract																												
RFCM Qualification Build																												
RFCM Critical Design Review																												
RFCM Production Qualification Testing																												
RFCM Developmental Test and Evaluation																												
RFCM Milestone C																												

Note
 Project EB9 / Aviation Airborne Expendable Countermeasures within PE 0603639A / Tank and Medium Caliber Ammunitions transitions to Engineering and Manufacturing Development (EMD) under Project EP7 / Aviation Airborne Expendable Countermeasures within PE 0604802A / Weapons and Munitions - Eng Dev.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP7 / <i>Aviation Airborne Expendable Countermeasures</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM215 Development	1	2019	4	2025
XM215 Milestone A	1	2019	1	2019
XM215 Prototyping	1	2019	2	2020
XM215 Down Select	3	2019	3	2019
XM215 Testing Efforts (Stability/Heat/Cold)	3	2019	2	2020
XM215 Flight Testing	1	2020	2	2020
XM215 Milestone B	2	2020	2	2020
XM215 Development Contract	2	2020	4	2022
XM215 Design Verification Test	2	2021	3	2021
XM215 Flight Test	3	2021	4	2021
XM215 Developmental and Operational Testing	2	2022	4	2022
XM215 Milestone C	2	2023	2	2023
RFCM Development	1	2019	4	2025
RFCM Milestone A	1	2019	1	2019
RFCM Prototype Development	1	2019	4	2019
RFCM Demonstrations	2	2019	3	2019
RFCM Flight Testing 1	4	2019	4	2019
RFCM Data Analysis	4	2019	3	2020
RFCM Milestone B	3	2020	3	2020
RFCM Development Contract	3	2020	1	2022
RFCM Qualification Build	1	2021	2	2021
RFCM Critical Design Review	2	2021	2	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures
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Events	Start		End	
	Quarter	Year	Quarter	Year
RFCM Production Qualification Testing	2	2021	3	2021
RFCM Developmental Test and Evaluation	3	2021	4	2021
RFCM Milestone C	1	2022	1	2022

Note
 Project EB9 Aviation Airborne Expendable Countermeasures within Program Element (PE) 0603639A Tank and Medium Caliber Ammunitions transitions to EMD under Project EP7 Aviation Airborne Expendable Countermeasures within PE 0604802A Weapons and Munitions - Eng Dev.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose			
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
EU4: 40mm HV Improved High Explosive Dual Purpose	-	6.937	13.055	8.351	-	8.351	2.311	0.000	0.000	0.000	0.000	30.654
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

40 millimeter (mm) High Velocity (HV) High Explosive Dual Purpose - Airburst (HEDP-AB) is a new capability identified in the 40mm High Velocity Improved High Explosive Dual Purpose Cartridge Capability Development Document (CDD) and will provide the Mk19 Mod 3 Grenade Machine Gun (GMG) an airburst capable cartridge with the ability of achieving required lethal effects against enemy targets in the open and in defilade while maintaining the capability to defeat unarmored and lightly armored vehicles. Fiscal Year (FY) 2021 funding supports continuing Engineering and Manufacturing Development (EMD) activities including Developmental Test & Evaluation (DT&E), Soldier Touch Point (STP), Family of Weapon Sights - Crew Served (FWS-CS) and Common Remote Operating Weapons System (CROWS) Integration.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: EMD</p> <p>Description: Award EMD contracts to support Design Engineering Testing (DET) and DT&E of the 40mm dual purpose airburst capability.</p> <p>FY 2020 Plans: FY 2020 funding supported EMD activities including DET 1, DET 2, STP and FWS-CS Integration.</p> <p>FY 2021 Base Plans: FY 2021 funding will support continuing EMD activities including DT&E, STP, FWS-CS and CROWS Integration.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Program decrease based on level of effort for continued contractor development, DET and STP.</p>	6.937	12.463	8.351	-	8.351
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	0.592	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 I 40mm HV Improved High Explosive Dual Purpose

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	6.937	13.055	8.351	-	8.351

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• E70505: CTG, 40mm HV GMG, I-HEDP	-	-	0.000	-	0.000	15.206	17.517	-	-	0.000	32.723

Remarks

D. Acquisition Strategy

The 40mm HV HEDP-AB cartridge will be developed through a competitive EMD program. Milestone B approval was followed by a competitive award for the EMD phase which included DET 1 and DET 2 to enter into DT&E. One contractor was awarded to develop an airburst capable fuze to be retrofitted onto the currently fielded, High Explosive Point Detonating cartridges and develop a Programming Unit. Test results will support the documentation for Milestone C. After Milestone C is achieved, a contract will be awarded for Low Rate Initial Production (LRIP) followed by two options.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EU4 I 40mm HV Improved High Explosive Dual Purpose							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.592		-		-		-	0.000	0.592	-
Subtotal			-	-		0.592		-		-		-	0.000	0.592	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Manager Maneuver Ammunition Systems (PM MAS)	MIPR	Picatinny Arsenal : NJ	0.242	0.300	Jan 2019	-		-		-		-	0.000	0.542	-
Engineering and Manufacturing Development (EMD) Contract DET 1 & 2	C/CPFF	Rheinmatell, Day & Zimmermann Munitions : Rosslyn, Va.	-	4.858	Jul 2019	4.430	Oct 2019	2.805	Dec 2020	-		2.805	Continuing	Continuing	Continuing
Engineering and Manufacturing Development (EMD) Contract DT&E	C/CPFF	Rheinmatell, Day & Zimmermann Munitions : Rosslyn, Va.	-	-		4.430	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Subtotal			0.242	5.158		8.860		2.805		-		2.805	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	MIPR	Combat Capabilities Development Command - Armaments Center (CCDC-AC) : Picatinny Arsenal, NJ	2.153	1.457	Oct 2018	1.880	Oct 2019	2.208	Oct 2020	-		2.208	Continuing	Continuing	Continuing
Subtotal			2.153	1.457		1.880		2.208		-		2.208	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering and Manufacturing Development (EMD)	[Blue bar spanning FY 2019 Q1 to FY 2022 Q4]																											
Test Readiness Review for Design Engineering Test 1	[Grey shaded area from FY 2019 Q1 to FY 2020 Q4]																											
Design Engineering Test (DET) 1	[Blue triangle 1: TRR DET 1 in FY 2019 Q4]																											
Test Readiness Review for Design Engineering Test 2	[Blue triangle 2: TRR DET 2 in FY 2020 Q2]																											
Design Engineering Test (DET) 2	[Blue square: DET 2 in FY 2020 Q3]																											
Developmental Test & Evaluation (DT&E) Contract Award	[Blue triangle 3: DT&E Award in FY 2020 Q4]																											
Critical Design Review (CDR)	[Blue triangle 4: CDR in FY 2020 Q4]																											
Developmental Test & Evaluation (DT&E)	[Blue bar: DT&E in FY 2021 Q2]																											
Limited User Evaluation (LUE)	[Blue square: LUE in FY 2021 Q3]																											
Milestone C	[Blue triangle 5: MS-C in FY 2022 Q1]																											
Low Rate Initial Production (LRIP) Contract Award	[Blue triangle 6: LRIP Contract Award in FY 2022 Q1]																											
Low Rate Initial Production (LRIP)	[Blue bar: LRIP in FY 2022 Q3 to FY 2023 Q4]																											
Live Fire Test and Evaluation (LFT&E)	[Blue square: LFT&E in FY 2023 Q3]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 I 40mm HV Improved High Explosive Dual Purpose

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone B Support Documents	2	2017	4	2018
Milestone B	4	2018	4	2018
Engineering and Manufacturing Development (EMD)	4	2018	2	2022
Test Readiness Review for Design Engineering Test 1	4	2019	4	2019
Design Engineering Test (DET) 1	1	2020	2	2020
Test Readiness Review for Design Engineering Test 2	2	2020	2	2020
Design Engineering Test (DET) 2	3	2020	4	2020
Developmental Test & Evaluation (DT&E) Contract Award	4	2020	4	2020
Critical Design Review (CDR)	4	2020	4	2020
Developmental Test & Evaluation (DT&E)	3	2021	1	2022
Limited User Evaluation (LUE)	3	2021	4	2021
Milestone C	2	2022	2	2022
Low Rate Initial Production (LRIP) Contract Award	2	2022	2	2022
Low Rate Initial Production (LRIP)	3	2022	4	2023
Live Fire Test and Evaluation (LFT&E)	3	2023	3	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev					Project (Number/Name) EU5 / .50 Caliber All-Purpose Tactical cartridge (APTC)		
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
EU5: .50 Caliber All-Purpose Tactical cartridge (APTC)	-	0.000	0.000	8.491	-	8.491	9.390	0.000	0.000	11.989	0.000	29.870
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC) transitions from Budget Activity (BA) 4 Program Element (PE) 0603639A Tank and Medium Caliber Ammunition Project EU3 .50 Caliber APTC.

A. Mission Description and Budget Item Justification

The APTC project is a critical technology development in response to the .50 caliber Munitions Capabilities Development Documents (CDD). The overall objective of All-Purpose Tactical Cartridge is to deliver Ball and Tracer ammunition that replaces and improves current legacy .50 caliber ammunition. The All-Purpose Tactical Cartridge will be compatible with all Army .50 caliber weapons but specifically optimized to work in the M2 Machine Guns. Fiscal Year (FY) 2021 funding supports Engineering and Manufacturing Development (EMD), Milestone B (MS-B) accomplishment, conducting Design Verification Tests (DVT), and performing Pre-Production Qualification Tests (PPQT).

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: .50 Cal All-Purpose Tactical Cartridge EMD	-	-	8.491	-	8.491
Description: EMD Activities for the development of the .50 Caliber All-Purpose Tactical Cartridge APTC.					
FY 2021 Base Plans: Will achieve Milestone B (MS-B), award two competing EMD contracts to two contractors, conduct DVT on the competing concepts, and perform PPQT on the competing concepts.					
FY 2020 to FY 2021 Increase/Decrease Statement: Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project EU3 .50 Caliber APTC.					
Accomplishments/Planned Programs Subtotals	-	-	8.491	-	8.491

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU5 / .50 Caliber All-Purpose Tactical cartridge (APTC)
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	-	4.250	0.000	-	0.000	-	-	-	-	0.000	4.250

Remarks

The effort under BA4, PE 0603639A, Project EU3, .50 Caliber APTC, starts the technology maturation of the .50 Caliber APTC in FY 2020. The effort transitions in FY 2021 to BA5, PE 0604802A, Project EU5. PE 0604802A, Project EU5 .50 Caliber APTC to continue the development work and support EMD beginning in FY 2021.

D. Acquisition Strategy

Evaluate competing concepts/prototypes from contractors and Government. In FY 2021, the Government intends to select up to two competing contractors to begin Engineering and Manufacturing Development (EMD). In FY 2022, the Government intends to select a single contractor to complete final qualification and testing in preparation for the transition to production in FY 2023.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EU5 / .50 Caliber All-Purpose Tactical cartridge (APTC)							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Contract # 1	Option/CPFF	To be determined : To be determined	-	-		-		2.700	Jan 2021	-		2.700	Continuing	Continuing	-
Development Contract # 2	Option/CPFF	To be determined : To be determined	-	-		-		2.700	Jan 2021	-		2.700	Continuing	Continuing	-
Subtotal			-	-		-		5.400		-		5.400	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Combat Capabilities Development Command, Armaments Center (CCDC, AC) Support	MIPR	Picatinny Arsenal : New Jersey	-	-		-		0.741	Oct 2020	-		0.741	Continuing	Continuing	Continuing
Combat Capabilities Development Command (CCDC) Army Research Lab (ARL)	MIPR	CCDC Army Research Lab (ARL) : Aberdeen, Maryland	-	-		-		1.500	Oct 2020	-		1.500	Continuing	Continuing	Continuing
Subtotal			-	-		-		2.241		-		2.241	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Pre-Production Qualification Testing	MIPR	US Army Test Center (ATC) : Aberdeen, Maryland	-	-		-		0.500	Oct 2020	-		0.500	Continuing	Continuing	Continuing
Design Verification Testing	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		0.350	Oct 2020	-		0.350	Continuing	Continuing	Continuing
Subtotal			-	-		-		0.850		-		0.850	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army								Date: February 2020			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU5 / .50 Caliber All-Purpose Tactical cartridge (APTC)			
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals	-	-	0.000	8.491	-	8.491	Continuing	Continuing	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EU5 / <i>.50 Caliber All-Purpose Tactical cartridge (APTC)</i>

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025						
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
APTC Materiel Development Decision (MDD)				▲ 1 APTC MDD																											
APTC Concept & Prototype Development					■ APTC Concept & Prototype Development																										
APTC Design Verification Test (DVT) 1					■ APTC DTV 1																										
APTC Preliminary Design Review (PDR)								▲ 2 APTC PDR																							
APTC Milestone B									▲ 3 APTC MS-B																						
APTC Transitions from BA04 EU3 to BA05 EU5									▲ 4 APTC BA04 to BA05 Transition																						
APTC Engineering & Manufacturing Development (EMD)										■ APTC EMD																					
APTC Design Verification Test (DVT) 2									■ APTC DVT 2																						
APTC Pre-Production Qualification Testing (PPQT)											■ APTC PPQT																				
APTC Critical Design Review (CDR)												▲ 5 APTC CDR																			
APTC Production Qualification Testing (PQT)													■ APTC PQT																		
APTC Milestone C (MS-C)																							▲ 6 APTC MS-C								

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EU5 / <i>.50 Caliber All-Purpose Tactical cartridge (APTC)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
APTC Materiel Development Decision (MDD)	1	2020	1	2020
APTC Concept & Prototype Development	1	2020	1	2021
APTC Design Verification Test (DVT) 1	2	2020	3	2020
APTC Preliminary Design Review (PDR)	4	2020	4	2020
APTC Milestone B	1	2021	1	2021
APTC Transitions from BA04 EU3 to BA05 EU5	1	2021	1	2021
APTC Engineering & Manufacturing Development (EMD)	2	2021	4	2022
APTC Design Verification Test (DVT) 2	2	2021	3	2021
APTC Pre-Production Qualification Testing (PPQT)	4	2021	4	2021
APTC Critical Design Review (CDR)	2	2022	2	2022
APTC Production Qualification Testing (PQT)	3	2022	4	2022
APTC Milestone C (MS-C)	1	2023	1	2023

Note

Note:
All-Purpose Tactical Cartridge (APTC)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range			
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
EU6: 155mm HE Rocket Assist Project Extended Range	-	37.565	18.943	31.236	-	31.236	2.997	2.997	0.000	0.000	0.000	93.738
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 155 millimeter (mm) High Explosive (HE) Rocket Assisted Projectile, Extended Range Project supports the development of materiel solutions to meet the Army's long range precision fires modernization strategy. This Project supports projectile development efforts to achieve ranges of 40 kilometers (km) in current artillery weapon systems (39 caliber tube length) and characterize longer ranges in future artillery weapon systems (58 caliber tube length Extended Range Cannon Artillery, (ERCA). These efforts will leverage enhanced lethality cannon munition technologies to compensate for increased rocket motor volume. The projectile body will be filled with an insensitive munition (IM) HE and a supplementary charge to improve soldier survivability. Fiscal Year (FY) 2021 funding supports the Urgent Materiel Release (UMR) activities of XM1113 including fire control software integration and development and qualification testing for current artillery systems. FY 2021 funding will also support the continuation of characterization activities required for a projectile concept compatible with the ERCA weapon systems to achieve the Army's requirement of extended range lethality with precision accuracy by FY 2023.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 155mm High Explosive Rocket Assist Project (RAP) Extended Range	37.565	18.536	31.236	-	31.236
Description: Evaluate, Develop, and Qualify Extended Range Technologies.					
FY 2020 Plans: FY 2020 funding supported the XM1113 qualification, fuze performance evaluation and confirmation for Urgent Materiel Release (UMR) in FY 2021, as well as provided the continued engineering efforts of the XM1113 maturation in support of a Milestone C. FY 2020 funding also supported the initiation of characterization activities for 58 caliber weapon systems; such as, Precision Guidance-Aft, to achieve the Army's requirement of longer range lethality with precision accuracy in FY 2023.					
FY 2021 Base Plans: FY 2021 funding supports the UMR activities of XM1113 including fire control software integration and development and qualification testing for current artillery systems. FY 2021 funding will also support the continuation of characterization activities required for a projectile concept compatible with the ERCA weapon systems to achieve the Army's requirement of extended range lethality with precision accuracy by FY 2023.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Increase in funding from FY 2020 to FY 2021 in order to achieve the Army's requirement of 70km with precision accuracy by FY 2023.					
Title: FY 2020 SBIR/STTR Transfer	-	0.407	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	37.565	18.943	31.236	-	31.236

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• E66501: PROJ, 155mm ARTY HE RAP, XM1113	-	20.000	26.972	-	26.972	51.647	52.588	54.466	55.405	0.000	261.078

Remarks

D. Acquisition Strategy
The 155mm HE Rocket Assisted Projectile, Extended Range Project is utilizing a single DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiative with GD-OTS to support the accelerated timeline and UMR of 2,000 projectiles for 39 caliber weapon systems, and will achieve lethality against targets at 40km range. DOTC OTA initiatives are also being utilized for projectile characterization of the XM1113 for the 58 caliber weapon systems, Extended Range Cannon Artillery (ERCA) Increments 1C and 2, for Full Materiel Release (FMR). The Program will transition to a Federal Acquisition Regulation (FAR) based production contract after Milestone C for Low Rate Initial Production (LRIP) and Full Rate Production (FRP).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.190	Oct 2018	0.048	Oct 2019	0.150	Oct 2020	-		0.150	0.000	0.388	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.407		-		-		-	0.000	0.407	-
Subtotal			-	0.190		0.455		0.150		-		0.150	0.000	0.795	N/A

Remarks
Program Management support includes travel and milestone documentation support.

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : G-DOTS	-	27.223	Nov 2018	12.587	Nov 2019	16.125	Nov 2020	-		16.125	17.000	72.935	-
Subtotal			-	27.223		12.587		16.125		-		16.125	17.000	72.935	N/A

Remarks
Additional funding required for prototype hardware to support the Urgent Materiel Release (UMR) for 39 caliber systems as well as the development activities for 58 caliber weapon systems.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support	MIPR	Combat Capabilities Development Command	-	5.204	Oct 2018	3.148	Mar 2020	4.761	Oct 2020	-		4.761	11.400	24.513	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
		Armaments Center (CCDC AC) : Picatinny Arsenal, NJ													
Fire Control Software Integration	MIPR	U.S. Army Communications-Electronics Command (CECOM) : Aberdeen, MD	-	0.362	Sep 2019	-		2.000	Mar 2021	-		2.000	0.000	2.362	-
Subtotal			-	5.566		3.148		6.761		-		6.761	11.400	26.875	N/A

Remarks
Additional funding required for engineering support and fire control software integration to support both the Urgent Materiel Release (UMR) for 39 caliber systems as well as the development activities for 58 caliber weapon systems.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Testing	MIPR	Army Research Lab (ARL) : Adelphi, MD	-	0.600	Jan 2019	-		-		-		-	0.000	0.600	-
Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	2.286	Mar 2019	2.753	Mar 2020	3.200	Mar 2021	-		3.200	9.500	17.739	-
Testing	MIPR	Army Test and Evaluation Command (ATEC) Aberdeen Proving Ground (APG) : Aberdeen, MD	-	1.700	Jul 2019	-		4.500	Mar 2021	-		4.500	0.000	6.200	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
XM1113 High Explosive Rocket Assisted Projectile																												
Lethality Testing	[Bar]																											
Lethality Testing																												
Material Development Decision (MDD)																												
XM1113 HE RAP Engineering Manufacturing Development (EMD)					[Bar]				[Bar]				[Bar]															
XM1113 EMD					[Bar]				[Bar]				[Bar]															
39 cal Qualification					[Bar]				[Bar]																			
39 cal Qual					[Bar]				[Bar]																			
39 cal Urgent Materiel Release (UMR)																												
39 cal UMR																												
39 cal Milestone C																												
39 cal MS-C																												
39 cal Full Materiel Release (FMR)																												
39 cal FMR																												
58 cal Characterization																												
58 cal Characterization																												
58 cal Knowledge Point (KP)																												
58 cal KP																												
XM1113E1 HE RAP Extended Range																												
XM1113E1 HE RAP Extended Range EMD					[Bar]				[Bar]																			
XM1113E1 EMD					[Bar]				[Bar]																			

Note
 XM1113 UMR will achieve lethality against targets at 40km range. XM1113E1 will achieve 70+km out of ERCA.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM1113 High Explosive Rocket Assisted Projectile	1	2019	4	2023
Lethality Testing	1	2019	1	2020
Materiel Development Decision (MDD)	4	2019	4	2019
XM1113 HE RAP Engineering Manufacturing Development (EMD)	4	2019	4	2022
39 cal Qualification	4	2019	4	2021
39 cal Urgent Materiel Release (UMR)	4	2021	4	2021
39 cal Milestone C	4	2022	4	2022
39 cal Full Materiel Release (FMR)	4	2023	4	2023
58 cal Characterization	4	2021	4	2023
58 cal Knowledge Point (KP)	4	2023	4	2023
XM1113E1 HE RAP Extended Range	3	2021	4	2023
XM1113E1 HE RAP Extended Range EMD	2	2020	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev			Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions				
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
EU7: Enhanced Lethality Cannon Munitions	-	10.915	7.908	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	18.823
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project EU7 Enhanced Lethality Cannon Munitions transitions to Procurement.

A. Mission Description and Budget Item Justification

The Enhanced Lethality Cannon Munitions (ELCM) Project will evaluate, develop, and qualify new lethality technologies for 155 millimeter (mm) cannon artillery munitions and evaluate their effectiveness in mitigating evolving and derived capability gaps, and support transition to production. The ELCM Project supports testing and assessment of the Israeli Military Industries (IMI) Systems M999 advanced anti-personnel munition in support the Army Directed Requirement for a Rapid Bridging Solution for the replacement of the 155mm Dual Purpose Improved Conventional Munition (DPICM). This Project also accelerates the qualification of the 155mm XM1128 High Explosive Projectile, which will replace the M795 Critical Munition once qualified. Engineering efforts are ongoing and will support the evaluation of the XM1128 test data to determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021. In Fiscal Year (FY) 2021, this Project does not have an Research Development Technology & Evaluation (RDT&E) request.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 155mm XM1128 High Explosive Projectile	10.915	7.549	-	-	-
Description: Evaluate, Develop, and Qualify Enhanced Lethality Technologies.					
FY 2020 Plans: FY 2020 funds supported fuze performance evaluation and confirmation with XM1128, as well as continued Insensitive Munitions (IM) testing, Sequential Environmental Test - Safety (SET-S), and Military Standard environmental testing (MIL-STD-810). Engineering efforts supported the evaluation of the XM1128 test data to determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021.					
FY 2020 to FY 2021 Increase/Decrease Statement: Project EU7 Enhanced Lethality Cannon Munitions transitions to Procurement.					
Title: FY 2020 SBIR/STTR Transfer	-	0.359	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<i>FY 2020 Plans:</i> Funding transferred in accordance with Title 15 USC 638					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	10.915	7.908	-	-	-

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• E67802: PROJ, 155mm ARTY HE-BB, XM1128	-	14.994	0.000	-	0.000	50.189	119.663	125.707	126.241	0.000	436.794

Remarks
In FY 2020, XM1128 is transitioning to production. A Procurement of Ammunition, Army (PAA) funding line, Standard Study Number (SSN) E67802, PROJ, 155mm ARTY HE-BB, XM1128, has been established.

D. Acquisition Strategy
The XM1128 High Explosive munition has been accelerated for qualification, per the Army Directed Requirement for a Rapid Bridging Solution for the 155mm DPICM as of 22 December 2016, as an inherent part of the Rapid Bridging solution for 155mm DPICM. Prototyping was awarded in 1st Quarter (1Q) FY 2018 through Department of Defense (DoD) Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives to multiple vendors (subcontractors to United States (U.S.) Government system integrator) through Engineering & Manufacturing Development (EMD). The U.S. Government will lead EMD efforts to complete development by end 4Q FY 2020. Milestone C approval is in 2Q FY 2021. Following Milestone C, the XM1128 will be competed via Federal Acquisition Regulation (FAR) based contracts for Load, Assemble, and Pack (LAP) and metal parts in support of Low Rate Initial Production (LRIP) and follow-on production activities. Full Material Release (FMR) is planned for 1Q FY 2022.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Enhanced Lethality Cannon Munitions (ELCM) Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.347	0.140	Oct 2018	0.060	Oct 2019	-		-		-	0.000	0.547	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.359		-		-		-	0.000	0.359	-
Subtotal			0.347	0.140		0.419		-		-		-	0.000	0.906	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM1128 Prototype Qualification Tests (PQT) Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	10.074	3.304	Feb 2019	4.139	Dec 2019	-		-		-	0.140	17.657	-
XM1113 Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	4.494	-		-		-		-		-	0.000	4.494	-
Subtotal			14.568	3.304		4.139		-		-		-	0.140	22.151	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM1128 Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	5.294	2.132	Mar 2019	1.940	Mar 2020	-		-		-	1.377	10.743	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM1128 Firing Table Software Updates	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Adelphi, MD	2.123	-		-		-		-		-	0.000	2.123	-
M999 Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	0.750	-		-		-		-		-	0.000	0.750	-
XM1113 Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	0.606	-		-		-		-		-	0.000	0.606	-
Subtotal			8.773	2.132		1.940		-		-		-	1.377	14.222	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM1128 Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	3.089	Mar 2019	1.410	Mar 2020	-		-		-	0.000	4.499	-
XM1128 Testing	MIPR	Naval Surface Warfare Center (NSWC) ? Dahlgren : Dahlgren, VA	-	1.500	Nov 2018	-		-		-		-	0.000	1.500	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
XM1128																																
XM1128 Prototyping	[Blue Bar]																															
	XM1128 Prototyping																															
XM1128 Lethality Testing and Assessment	[Blue Bar]																															
	XM1128 Lethality Testing and Assessment																															
XM1128 Critical Design Review (CDR)	▲ 1 XM1128 CDR																															
XM1128 Performance Qualification Testing (PQT)	[Blue Bar]																															
	XM1128 PQT																															
XM1128 Baseline Prototyping					[Blue Bar]																											
					XM1128 Baseline Prototyping																											
XM1128 Milestone C									▲ 2 XM1128 MS-C																							
XM1128 Full Materiel Release (FMR)																	▲ 3 XM1128 FMR															
M999																																
M999 Testing	[Blue Bar]																															
	M999 Testing																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM1128	3	2017	1	2021
XM1128 Prototyping	3	2017	4	2019
XM1128 Milestone B	1	2018	1	2018
XM1128 Lethality Testing and Assessment	4	2017	4	2019
XM1128 Critical Design Review (CDR)	2	2019	2	2019
XM1128 Performance Qualification Testing (PQT)	2	2019	3	2020
XM1128 Baseline Prototyping	4	2019	3	2020
XM1128 Milestone C	2	2021	2	2021
XM1128 Full Materiel Release (FMR)	1	2023	1	2023
M999	4	2018	4	2019
M999 Testing	4	2018	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU8 / Improved Multi-Option Fuze			
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
EU8: Improved Multi-Option Fuze	-	7.615	10.000	7.992	-	7.992	4.995	0.000	0.000	0.000	0.000	30.602
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Improved Multi-Option Fuze Project is a technology refresh and modernization effort that provides an incremental capability with technology advancements and performance improvements on the current non-precision artillery and mortar ammunition proximity multi-option fuze that will increase robustness to electronic countermeasures (ECM), eliminates the susceptibility of reverse engineering (RE), incorporates power source advancements, improves delay mode reliability, and integrates safe & arm improvements. This Project will develop and qualify safe, affordable, reliable, Proximity Height of Burst fuzing solutions with robust Defense Exportability Features (DEF) for non-precision conventional cannon artillery and mortar munitions that are resistant to adversary exploitation via ECM and RE threats. Fiscal Year (FY) 2021 funds will support Improved Multi-Option Fuze Mortar (iMOFM) design verification, hardware fabrication, qualification testing, and Fuze Qualification Testing for both Multi-Option Fuze Artillery (MOFA) II and iMOFM.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Improved Multi-Option Fuze Development	7.615	9.546	7.992	-	7.992
Description: Develop and qualify improved multi-option fuze technologies.					
FY 2020 Plans:					
FY 2020 funding supported the Engineering and Manufacturing Development (EMD) contract increments utilizing the Department of Defense Ordinance Technology Center (DOTC) Other Transaction Agreement (OTA) for MOFA II detailed designs, the fabrication of hardware and the execution of MOFA II Product Qualification Tests (PQT), ballistic engineering and qualification testing, iMOFM developmental verification tests, iMOFM Critical Design Review, the execution of iMOFM PQT and the preparations for transition into production.					
FY 2021 Base Plans:					
FY 2021 funds will support iMOFM design verification, hardware fabrication, qualification testing, and Fuze Qualification Testing for both MOFA II and iMOFM.					
FY 2020 to FY 2021 Increase/Decrease Statement:					
Decrease from FY 2020 to FY 2021 due to the reduction in contract costs associated with the design and fabrication of MOFA II and iMOFM hardware to support PQT.					
Title: FY 2020 SBIR/STTR Transfer	-	0.454	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	7.615	10.000	7.992	-	7.992

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• E99909: Multi-Option Fuze, Artillery M782	-	-	7.576	-	7.576	8.697	6.810	8.889	7.829	0.000	39.801

Remarks
In FY 2022, MOFA II will transition to production. Procurement of Ammunition, Army (PAA) funding will be executed on Standard Study Number (SSN) E99909, Multi-Option Fuze, Artillery M782.

D. Acquisition Strategy
The Improved Multi-Option Fuze Project will utilize the DOTC OTA with incrementally funded EMD contracts for improved and modernized MOFA II detailed designs and the fabrication of hardware. The Improved Multi-Option Fuze Project will enhance the existing multi-option fuzes for cannon artillery and mortar munitions programs of record. Detailed government-owned Technical Data Packages (TDPs) will enable "build to print" designs to facilitate competitive Federal Acquisition Regulation (FAR) based contracting for procurement. Qualified MOFA II will be a Technology Readiness Level 8 (TRL-8) TC design with a mature technical design packages for production. Parallel iMOFM effort will be a qualified TRL-8 design for incorporation into mortar cartridge production.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.898	0.135	Nov 2018	-		-		-		-	0.000	1.033	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.454		-		-		-	0.000	0.454	-
Subtotal			0.898	0.135		0.454		-		-		-	0.000	1.487	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOFA II Development & PQT Support	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	5.395	Apr 2019	5.263	Dec 2019	-		-		-	0.000	10.658	-
iMOFM Fuze Test Hardware & Qualification	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	0.595	Jun 2019	1.959	Mar 2020	2.000	Jan 2021	-		2.000	0.000	4.554	-
Subtotal			-	5.990		7.222		2.000		-		2.000	0.000	15.212	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	1.551	1.125	Nov 2018	1.024	Nov 2019	2.992	Nov 2020	-		2.992	0.000	6.692	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Engineering Support	C/LH	SAVIT Corporation : Rockaway, NJ	-	-		-		0.300	Mar 2021	-		0.300	0.000	0.300	-
Subtotal			1.551	1.125		1.024		3.292		-		3.292	0.000	6.992	N/A

Remarks
 There is a significant increase in Engineering Support due to additional support required for qualification testing, test plans, and test reports. In addition, coordination and funding of multiple offices is required to obtain the required documentation for a Type Classification and Milestone C decision on Multi-Option Fuze Artillery (MOFA) II as well as an Engineering Change Proposal (ECP) on improved Multi-Option Fuze Mortar (iMOFM).

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Improved Multi-Option Fuze Test and Evaluations	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	-	-		-		0.200	Mar 2021	-		0.200	0.000	0.200	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	0.187	0.215	Jun 2019	0.952	Jun 2020	1.350	Mar 2021	-		1.350	0.000	2.704	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	U.S. Army Research Lab (ARL) : Adelphi, MD	0.150	0.150	Nov 2018	0.024	Jan 2020	0.100	Dec 2020	-		0.100	0.000	0.424	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	White Sands Missile Range (WSMR) : White Sands, NM	-	-		0.324	Jun 2020	0.700	Mar 2021	-		0.700	0.000	1.024	-
Improved Multi-Option Fuze Cyber Security Testing	MIPR	TBD : TBD	-	-		-		0.350	Mar 2021	-		0.350	0.000	0.350	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			0.337	0.365		1.300		2.700		-		2.700	0.000	4.702	N/A

Remarks
Cyber Security testing for MOFA II is required during Fiscal Year (FY) 2021. The test location will be determined based on informed requirements by March 2021.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.786	7.615	10.000	7.992	-	7.992	0.000	28.393	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Fabricate Prototypes	██████████ Fabricate Prototypes																											
Conduct Evaluations and Design Reviews	██████████ Evaluations and Design Reviews																											
MOFA II																												
Fabricate MOFA II System Level Qualification Hardware					██████████ Fabricate Hardware																							
MOFA II Safety, Reliability, Environmental, Qualification Testing									██████████ Qualification Testing																			
MOFA II Milestone C													▲ MS-C															
iMOFM																												
Fabricate iMOFM System Level Qualification Hardware					██████████ Fabricate Hardware																							
iMOFM Qualification Testing													██████████ Qualification Testing															
iMOFM ECP																	▲ ECP											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Fabricate Prototypes	3	2018	3	2019
Conduct Evaluations and Design Reviews	2	2019	4	2019
MOFA II	3	2019	4	2022
Fabricate MOFA II System Level Qualification Hardware	2	2020	3	2021
MOFA II Safety, Reliability, Environmental, Qualification Testing	1	2021	2	2022
MOFA II Milestone C	2	2022	2	2022
iMOFM	2	2020	4	2022
Fabricate iMOFM System Level Qualification Hardware	3	2020	3	2021
iMOFM Qualification Testing	4	2021	3	2022
iMOFM ECP	4	2022	4	2022

Note

Multi-Option Fuze Artillery (MOFA)
improved Multi-Option Mortar (iMOFM)
Engineering Change Proposal (ECP)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EW1 / 40mm Low Velocity Ammunition			
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
EW1: 40mm Low Velocity Ammunition	-	8.467	14.032	22.479	-	22.479	5.958	1.998	0.000	0.000	0.000	52.934
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 40 millimeter (mm) Low Velocity High Explosive Air Burst (HEAB) is a new capability identified as a Warfighter requirement in the Capability Development Document (CDD), 40mm Low Velocity (LV) Family of Ammunition Annex. The HEAB tactical cartridge allows the Warfighter to engage targets at increased effective ranges using the 40mm M320 Grenade Launcher. The HEAB cartridge provides the grenadier with a higher probability of achieving a first shot kill against enemy personnel, coupled with the ability to defeat personnel targets in defilade positions. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel beyond those offered by the current M433 High Explosive Dual Purpose (HEDP) cartridge. The cartridge provides lethal effects against targets with improved accuracy and greater standoff ranges resulting in increased soldier survivability. Fiscal Year (FY) 2021 will support any remaining Design Engineering Test build; Soldier Touch Point (Limited User Evaluation), Critical Design Review, Test Readiness Reviews (TRRs) and Developmental Test and Evaluation (DT&E) build and test.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: 40mm LV HEAB, XM1166</p> <p>Description: Engineering Manufacturing Development (EMD) of the 40mm LV HEAB munition.</p> <p>FY 2020 Plans: FY 2020 EMD activities included TRRs, Design Engineering Test (DET) hardware build, DET 2 testing, a Soldier Touch Point LUE and DET 3 hardware build.</p> <p>FY 2021 Base Plans: FY 2021 will support the remaining DET 3 build and test, Critical Design Review, TRRs and hardware build for Development Test and Evaluation.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to increased level of effort supporting multiple test activities.</p>	8.467	13.395	22.479	-	22.479
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans:</p>	-	0.637	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC 638					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i>					
Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	8.467	14.032	22.479	-	22.479

C. Other Program Funding Summary (\$ in Millions)	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
• E71005: CTG, 40mm LV, IRAP	-	-	0.000	-	0.000	11.589	13.581	-	-	0.000	25.170

Remarks

D. Acquisition Strategy

The HEAB cartridge will be developed through a competitive EMD program. Potential designs were evaluated as part of the pre-EMD activities using a Cooperative Research and Development Agreement (CRADA) with contractors. For EMD, the Government awarded two contracts utilizing an Other Transaction Agreement (OTA) through Department of Defense (DoD) Ordnance Technology Consortium (DOTC). The EMD phase will consist of a series of DETs to assess the Contractors' design progress and ability of achieving the program objectives. Any shortcomings and deficiencies will be addressed prior to final DT&E. After DT&E and a successful Milestone C, the Government will down-select to a single contractor for Low Rate Initial Production (LRIP) and four production year options utilizing a follow-on Federal Acquisition Regulation (FAR) based contract.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EW1 / 40mm Low Velocity Ammunition							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.637		-		-		-	0.000	0.637	-
Subtotal			-	-		0.637		-		-		-	0.000	0.637	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LV HEAB XM1166 Contractor 1	C/CPFF	Day & Zimmerman, Inc (DZI) : Middletown, IA	3.900	3.467	Jan 2019	5.557	Oct 2019	8.400	Jan 2021	-		8.400	Continuing	Continuing	Continuing
LV HEAB XM1166 Contractor 2	C/CPFF	Chemring Ordnance, Inc : Perry, FL	3.900	3.276	Jan 2019	5.557	Oct 2019	8.400	Jan 2021	-		8.400	Continuing	Continuing	Continuing
Subtotal			7.800	6.743		11.114		16.800		-		16.800	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
LV HEAB XM1166 - Engineering Support	MIPR	Combat Capabilities Development Command - Armaments Center (CCDC-AC) : Picatinny Arsenal, NJ	1.250	1.064	Nov 2018	1.190	Oct 2019	1.479	Jan 2021	-		1.479	Continuing	Continuing	Continuing
Subtotal			1.250	1.064		1.190		1.479		-		1.479	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LV HEAB XM1166 Design Engineering Test (DET) 1	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	0.660	Oct 2019	-		-		-		-	0.000	0.660	-
LV HEAB XM1166 Design Engineering Test (DET) 2	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		1.091	Feb 2020	-		-		-	0.000	1.091	-
LV HEAB XM1166 Design Engineering Test (DET) 3	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		-		1.100	Jan 2021	-		1.100	0.000	1.100	-
LV HEAB XM1166 Developmental Test and Evaluation (DT&E)	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		-		3.100		-		3.100	0.000	3.100	-
Subtotal			-	0.660		1.091		4.200		-		4.200	0.000	5.951	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	9.050	8.467	14.032	22.479	-	22.479	Continuing	Continuing	N/A

Remarks
Notes:
Low Velocity (LV)
High Explosive Air Burst (HEAB)

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
40mm HEAB XM1166 Engineering Manufacturing Development																												
40mm HEAB XM1166 Preliminary Design Review																												
	HEAB EMD																											
	HEAB PDR																											
					HEAB DET 1																							
					STP1																							
					HEAB DET 2																							
					STP2																							
									HEAB DET 3																			
									HEAB CDR																			
													HEAB DT&E															
																	STP3											
																	HEAB MS-C											
																					HEAB LRIP							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EW1 / <i>40mm Low Velocity Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
40mm HEAB XM1166 Cooperative Research & Development Agreement (CRADA) Testing	3	2017	1	2018
40mm HEAB XM1166 Milestone B	4	2018	4	2018
40mm HEAB XM1166 Engineering Manufacturing Development	4	2018	4	2022
40mm HEAB XM1166 Preliminary Design Review	2	2019	2	2019
40mm HEAB XM1166 Design Engineering Test DET 1	1	2020	2	2020
40mm Soldier Touch Point 1 (STP1)	1	2020	2	2020
40mm HEAB XM1166 Design Engineering Test DET 2	2	2020	3	2020
40mm Soldier Touch Point 2 (STP2)	3	2020	3	2020
40mm HEAB XM1166 Design Engineering Test DET 3	1	2021	2	2021
40mm HEAB XM1166 Critical Design Review	2	2021	2	2021
40mm HEAB XM1166 DT&E	4	2021	1	2022
40mm Soldier Touch Point 3 (STP3)	2	2022	2	2022
40mm HEAB XM1166 Milestone C	3	2022	3	2022
40mm HEAB XM1166 Low Rate Initial Production	3	2022	4	2023

Note

millimeter (mm)
 Low Velocity (LV)
 High Explosive Air Burst (HEAB)

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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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
FA6: 30mm Lethality	-	19.128	22.897	20.091	-	20.091	9.788	5.995	2.997	0.000	0.000	80.896
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The 30 millimeter (mm) Lethality project funds the development of a suite of 30x173mm caliber cartridges, which includes a High Explosive Airburst with Trace (HEAB-T) cartridge, XM1182, for increased anti-personnel effects, an Armor Piercing Fin Stabilized Discarding Sabot with Trace (APFSDS-T) cartridge XM1170 for anti-material, and ballistically matched training cartridges; Target Practice with Trace (TP-T) and Target Practice Discarding Sabot with Trace (TPDS-T). A non-developmental airburst munition will be Urgent Materiel Released (UMR) as an interim solution prior to HEAB-T cartridge. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV), Next Generation Combat Vehicle (NGCV), and any Army Fighting Vehicles that are equipped with a 30x173mm weapon system. The tactical APFSDS-T cartridge will provide an organic direct fire capability to support infantry at a greater range and will improve lethality when engaging light-to-medium armored vehicles. The HEAB-T cartridge will provide the Warfighter with increased lethality against troops in the open, counter defilade, Anti-Tank Guided Missile (ATGM) teams, and troops behind urban structures. The training cartridges will be ballistically matched to the tactical cartridges, allowing the Warfighter to train in a cost effective manner. This project will leverage earlier efforts in support of the United States Army Europe (USAREUR) Operational Needs Statement (ONS) #15-20590 Stryker Increased Lethality for the 2nd Cavalry Regiment (2CR). Fiscal Year (FY) 2021 funding will support the continuation of Engineering, Manufacturing and Development (EMD) for all cartridges.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: 30X173mm Armor-Piercing Fin-Stabilized Discarding Sabot Trace (APFSDS-T) and Target Practice Discarding Sabot with Trace (TPDS-T)</p> <p>Description: Qualify 30x173mm armor piercing tactical and training cartridges for use on Stryker ICV, NGCV or other Army Future Fighting Vehicles.</p> <p>FY 2020 Plans: FY 2020 primary activities included three Design Engineering Tests (DET) and a Design Verification Test (DVT) for the non-airburst 30x173mm suite of ammunition. FY 2020 also supported the hardware build required for the remaining three DVTs scheduled for FY 2021.</p> <p>FY 2021 Base Plans: FY 2021 primary activities will include the continuation of the Design Engineering Tests and hardware build for the Developmental Test & Evaluation (DT&E) events.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	9.180	16.840	11.621	-	11.621

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Decreased due to hardware development initiated in FY 2020 thus reducing the effort in FY 2021.					
Title: 30x173mm HEAB-T and TP-T Description: Develop and qualify a 30x173mm airburst cartridge and trainer for use on Stryker Infantry Combat Vehicles (ICV), Next Generation Combat Vehicles (NGCV), or other Army Future Fighting Vehicles. FY 2020 Plans: FY 2020 primary activities included a Milestone B decision and awarded up to two contractors to support Engineering, Manufacturing, and Development (EMD). FY 2021 Base Plans: FY 2021 primary activities include DET & DT&E testing. FY 2020 to FY 2021 Increase/Decrease Statement: Funding request increased due to test costs and large quantity of hardware build in support of DT&E.	9.830	5.017	8.470	-	8.470
Title: 30x173mm Programmable Airburst Munitions (PABM) Urgent Materiel Release (UMR) Description: Qualify the 30x173mm MK310 Programmable Airburst Munition with Trace (PABM-T) ammunition to support the increased lethality for the 2nd Cavalry Stryker Regiment Directed Requirement.	0.118	-	-	-	-
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC 638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638	-	1.040	-	-	-
Accomplishments/Planned Programs Subtotals	19.128	22.897	20.091	-	20.091

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• E07610: CTG, 30MM, Progrmabl Air Burst Mun, Mk310, Linked	1.765	13.412	14.550	-	14.550	30.478	53.444	154.048	154.347	0.000	422.044

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FA6 / <i>30mm Lethality</i>
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• E07306: <i>CTG, 30mm TP-T, MK239, Single</i>	8.686	8.528	2.997	3.000	5.997	6.996	6.996	7.026	7.026	0.000	51.255
• E07406: <i>CTG, 30mm Hi Expl Incendry-T(HEI-T), Mk238 Series</i>	10.017	10.976	2.405	6.000	8.405	6.404	6.404	6.445	6.445	0.000	55.096
• E09191: <i>CTG, 30mm TPDS-T, MK317 (SABOT Trng), Single</i>	15.123	4.000	6.992	4.000	10.992	8.991	11.780	9.999	10.847	0.000	71.732
• E09292: <i>CTG, 30mm APFSDS-T, MK258, Single</i>	8.788	25.232	2.564	11.900	14.464	20.463	20.463	20.643	20.643	0.000	130.696

Remarks

D. Acquisition Strategy

30X173mm APFSDS-T and TPDS-T: Proposals were requested from Industry to develop a 30x173mm APFSDS-T anti-materiel tactical cartridge (XM1170) and a 30x173mm TPDS-T anti-materiel training cartridge (XM1172) that will meet Army Performance Specifications and Stryker Lethality Annex Requirements. Other Transaction Agreement (OTA) through two DOTC contracts were awarded to contractors to support development, DET and DT&E in support of Milestone C. The Government will award Federal Acquisition Regulation (FAR)- based contracts for production of each cartridge.

30x173mm HEAB-T and TP-T: In support of the 30mm Multi-Function Munition Capability Development Document (CDD), the 30x173mm HEAB-T cartridge (XM1182) and the ballistically matched TP-T cartridge (XM1173) will be developed to meet the requirements. The Government anticipates awarding two contracts utilizing an Other Transaction Agreement (OTA) through DOTC to support development, DET and DT&E in support of Milestone C. The Government will down-select and award a single FAR-based contract for production.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FA6 / 30mm Lethality							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.040		-		-		-	0.000	1.040	-
Subtotal			-	-		1.040		-		-		-	0.000	1.040	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
High Explosive Airburst with Trace (HEAB-T) TMRR Contract 1	C/CPFF	General Dynamics - Ordnance and Tactical Systems (GD-OTS) : Marion, IL	2.201	3.449	Jan 2019	-		-		-		-	0.000	5.650	-
High Explosive Airburst with Trace (HEAB-T) TMRR Contract 2	C/CPFF	Northrop Grumman Information Systems (NGIS) : Plymouth, MN	2.201	3.449	Jan 2019	-		-		-		-	0.000	5.650	-
High Explosive Airburst with Trace (HEAB-T) EMD Contract 1	C/CPFF	General Dynamics - Ordnance and Tactical Systems (GD-OTS) : Marion, IL	-	-		2.600	May 2020	3.516	Jan 2021	-		3.516	Continuing	Continuing	Continuing
High Explosive Airburst with Trace (HEAB-T) EMD Contract 2	C/CPFF	Northrop Grumman Information Systems (NGIS) : Plymouth, MN	-	-		2.602	May 2020	3.516	Jan 2021	-		3.516	Continuing	Continuing	Continuing
Armor Piercing Fin Stabilized Discarding Sabot with Trace (APFSDS-T) EMD Contract 1	C/CPFF	General Dynamics - Ordnance and Tactical Systems (GD-OTS) : Marion, IL	2.060	1.215	Jun 2019	7.027	Jan 2020	4.924	Jan 2021	-		4.924	0.000	15.226	-
Armor Piercing Fin Stabilized Discarding Sabot with Trace	C/CPFF	Northrop Grumman Information Systems	2.060	1.215	Jun 2019	7.027	Jan 2020	4.924	Jan 2021	-		4.924	0.000	15.226	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FA6 / 30mm Lethality								
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
(APFSDS-T) EMD Contract 2		(NGIS) : Plymouth, MN														
Steel Cartridge Case Development Contract	C/CPFF	General Dynamics - Ordnance and Tactical Systems : Marion, IL	-	5.793	Mar 2019	-		-		-		-	0.000	5.793	-	
Subtotal			8.522	15.121		19.256		16.880		-		16.880	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Engineering Support	MIPR	Combat Capabilities Development Command - Armaments Center (CCDC-AC) : Picatinny Arsenal, NJ	2.509	2.557	Jan 2019	2.427	Oct 2019	2.161	Nov 2020	-		2.161	Continuing	Continuing	Continuing	
Subtotal			2.509	2.557		2.427		2.161		-		2.161	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
MK310 Programmable Airburst Munition with Trace (PABM-T) Urgent Material Release (UMR) Qual	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	0.511	-		-		-		-		-	0.000	0.511	-	
APFSDS-T Design Engineering Tests (DET)	MIPR	Aberdeen Test Center (ATC) : Aberdeen Proving Ground, MD	-	-		-		1.050	Oct 2020	-		1.050	0.000	1.050	-	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
APFSDS-T Developmental Test & Evaluation (DT&E)	MIPR	Aberdeen Test Center (ATC) : Aberdeen Proving Ground, MD	-	-		0.174	Jul 2020	-		-		-	Continuing	Continuing	Continuing
High Explosive Airburst with Trace (HEAB-T) TMRR Testing	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	1.450	Jan 2019	-		-		-		-	0.000	1.450	-
Subtotal			0.511	1.450		0.174		1.050		-		1.050	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		11.542	19.128	22.897	20.091	-	20.091	Continuing	Continuing	N/A

Remarks
 Design Engineering Tests (DET)
 Engineering and Manufacturing Development (EMD)
 Technology Maturation & Risk Reduction (TMRR)

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FA6 / <i>30mm Lethality</i>

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Matériel Development Decision (MDD)			3 MDD																									
30mm APFSDS-T / TPDS-T EMD Contract Award			4 APFSDS-T / TPDS-T Contract Award																									
30mm APFSDS-T / TPDS-T EMD																												
30mm APFSDS-T DET Build																												
30mm APFSDS-T Design Engineer Test (DET)																												
30mm APFSDS-T Critical Design Review (CDR)																												
30mm APFSDS-T DT&E Hardware Build																												
30mm APFSDS-T Developmental Test & Evaluation (DT&E)																												
30mm APFSDS-T Milestone C																												
30mm APFSDS-T Low Rate Initial Production (LRIP)																												
30mm APFSDS-T Live Fire Test and Evaluation (LFT&E)																												
30mm TPDS-T DET Build																												
30mm TPDS-T Design Engineering Test (DET)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
30mm TPDS-T Critical Design Review (CDR)											10																	
30mm TPDS-T DT&E Hardware Build																												
30mm TPDS-T Developmental Test & Evaluation (DT&E)																												
30mm TPDS-T Milestone C																												
30mm TPDS-T Low Rate Initial Production (LRIP)																												
30mm HEAB-T TMRR Contract Awards																												
30mm HEAB-T Technology Maturation and Risk Reduction (TMRR)																												
30mm HEAB-T TMRR Engineering Test 1																												
30mm HEAB-T TMRR Engineering Test 2																												
30mm HEAB-T and TP-T EMD																												
30mm HEAB-T and TP-T Milestone B																												
30mm HEAB-T and TP-T EMD Contract Award																												
30mm HEAB-T / TP-T DET Build																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
30mm HEAB-T and TP-T EMD Design Engineering Test (DET)													[Bar] HEAB-T/TP-T EMD DET															
30mm HEAB-T / TP-T Critical Design Review (CDR)													▲ 9 HEAB-T / TP-T CDR															
30mm HEAB-T / TP-T DT&E Build													[Bar] HEAB-T / TP-T DT&E Build															
30mm HEAB-T and TP-T Developmental Test & Evaluation (DT&E)													[Bar] HEAB-T/TP-T DT&E															
30mm HEAB-T and TP-T Milestone C																	▲ 15 HEAB-T/TP-T MS C											
30mm HEAB-T / TP-T Low Rate Initial Production (LRIP)																	[Bar] HEAB-T / TP-T LRIP											
30mm HEAB-T Live Fire Test and Evaluation (LFT&E)																					[Bar] HEAB-T LFT&E							
30mm HEAB-T Initial Operational Test and Evaluation (IOT&E)																					[Bar] HEAB-T IOT&E							
30mm MK310 Mod 0 PABM-T UMR Safety Qualification Test	[Bar] PABM-T UMR Qual Test																											
30mm MK310 Mod 0 PABM-T Urgent Materiel Release (UMR)	▲ 2 PABM-T UMR Materiel Release																											
30mm MK310 Mod 0 PABM-T UMR Production Contract Award									▲ 5 PABM-T UMR Production Contract Award																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Matériel Development Decision (MDD)	3	2019	3	2019
30mm APFSDS-T / TPDS-T EMD Contract Award	4	2019	4	2019
30mm APFSDS-T / TPDS-T EMD	4	2019	1	2023
30mm APFSDS-T DET Build	2	2020	4	2020
30mm APFSDS-T Design Engineer Test (DET)	1	2021	1	2021
30mm APFSDS-T Critical Design Review (CDR)	3	2021	3	2021
30mm APFSDS-T DT&E Hardware Build	3	2021	1	2022
30mm APFSDS-T Developmental Test & Evaluation (DT&E)	2	2022	2	2022
30mm APFSDS-T Milestone C	1	2023	1	2023
30mm APFSDS-T Low Rate Initial Production (LRIP)	1	2023	3	2024
30mm APFSDS-T Live Fire Test and Evaluation (LFT&E)	2	2024	3	2024
30mm TPDS-T DET Build	3	2020	1	2021
30mm TPDS-T Design Engineering Test (DET)	2	2021	2	2021
30mm TPDS-T Critical Design Review (CDR)	3	2021	3	2021
30mm TPDS-T DT&E Hardware Build	4	2021	2	2022
30mm TPDS-T Developmental Test & Evaluation (DT&E)	3	2022	3	2022
30mm TPDS-T Milestone C	1	2023	1	2023
30mm TPDS-T Low Rate Initial Production (LRIP)	1	2023	3	2024
30mm HEAB-T TMRR Contract Awards	1	2019	1	2019
30mm HEAB-T Technology Maturation and Risk Reduction (TMRR)	1	2019	1	2020
30mm HEAB-T TMRR Engineering Test 1	3	2019	4	2019
30mm HEAB-T TMRR Engineering Test 2	4	2019	1	2020

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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Events	Start		End	
	Quarter	Year	Quarter	Year
30mm HEAB-T and TP-T EMD	2	2020	1	2023
30mm HEAB-T and TP-T Milestone B	2	2020	2	2020
30mm HEAB-T and TP-T EMD Contract Award	2	2020	2	2020
30mm HEAB-T / TP-T DET Build	2	2020	4	2020
30mm HEAB-T and TP-T EMD Design Engineering Test (DET)	1	2021	2	2021
30mm HEAB-T / TP-T Critical Design Review (CDR)	3	2021	3	2021
30mm HEAB-T / TP-T DT&E Build	3	2021	4	2021
30mm HEAB-T and TP-T Developmental Test & Evaluation (DT&E)	1	2022	3	2022
30mm HEAB-T and TP-T Milestone C	1	2023	1	2023
30mm HEAB-T / TP-T Low Rate Initial Production (LRIP)	2	2023	3	2024
30mm HEAB-T Live Fire Test and Evaluation (LFT&E)	2	2024	3	2024
30mm HEAB-T Initial Operational Test and Evaluation (IOT&E)	2	2024	3	2024
30mm MK310 Mod 0 PABM-T UMR Safety Qualification Build	2	2018	4	2018
30mm MK310 Mod 0 PABM-T UMR Safety Qualification Test	3	2018	1	2019
30mm MK310 Mod 0 PABM-T Urgent Materiel Release (UMR)	2	2019	2	2019
30mm MK310 Mod 0 PABM-T UMR Production Contract Award	4	2019	4	2019

Note

Engineering Manufacturing Development (EMD)
 Armor Piercing Fin Stabilized Discarding Sabot with Trace (APFSDS-T)
 Target Practice Discarding Sabot with Trace (TPDS-T)
 High Explosive Airburst with Trace (HEAB-T)
 Target-Practice with Trace (TP-T)
 Technology Maturation and Risk Reduction (TMRR)
 Urgent Materiel Release (UMR)
 Programmable Airburst Munition with Trace (PABM-T)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)			
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
FJ4: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.000	0.000	27.600	-	27.600	82.685	72.655	64.440	54.453	0.000	301.833
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from Budget Activity (BA) 4 Program Element (PE) 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.

A. Mission Description and Budget Item Justification

The C-DAEM Project will provide United States (U.S.) ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018 to inform Army acquisition and investment decisions regarding replacement of the current stockpile of 155 millimeter (mm) Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense (DoD) policy compliant munitions and address anti-armor and extended range capability requirements. The Army validated two materiel solutions for C-DAEM to be pursued in parallel. C-DAEM Armor (Increment 1) will destroy moved and moving infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM DPICM Replacement (Increment 2) will destroy personnel to light-skinned vehicles. Fiscal Year (FY) 2021 funding will support qualification of C-DAEM DPICM Replacement solution(s) for safety, performance, and DoD policy compliance verification testing to support the Army's modernization priorities in support of the National Defense Strategy.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: C-DAEM DPICM Replacement	-	-	27.600	-	27.600
Description: C-DAEM DPICM Replacement will destroy personnel to light-skinned vehicles.					
FY 2021 Base Plans: FY 2021 funding will support qualification of DPICM Replacement hardware to support the Army's modernization priorities in support of the National Defense Strategy.					
FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding from FY 2020 to FY 2021 due to technology maturation resulting in the transition of C-DAEM DPICM Replacement into the Engineering Manufacturing & Development (EMD) phase. Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.					
Accomplishments/Planned Programs Subtotals	-	-	27.600	-	27.600

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	5.713	21.447	40.961	-	40.961	-	-	-	-	Continuing	Continuing

Remarks

Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.

A Procurement of Ammunition, Army (PAA) funding line for C-DAEM DPICM Replacement, Standard Serial Number (SSN) E68604, PROJ, ARTY, 155MM C-DAEM INCREMENT 2, will be established in FY 2024 for this effort.

D. Acquisition Strategy

C-DAEM will employ an evolutionary acquisition approach to efficiently transition the unique ammunition products as they become available. The AoA completed on 31 January 2018 qualified a dramatic enhancement of operational Fires effectiveness, efficiency, and maneuver support when cannon artillery was equipped with a dedicated extended range, anti-armor projectile. In FY 2021, C-DAEM will utilize Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives for DPICM Replacement in support of hardware qualification testing. The U.S. Government will lead EMD efforts to complete qualification and meet Milestone C requirements by 4th Quarter (Q) FY 2024. C-DAEM DPICM Replacement will transition to a Federal Acquisition Regulation (FAR) based production contract after Milestone C for Low Rate Initial Production (LRIP) and Full Rate Production (FRP).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	Various	Office of the Project Manager Combat Ammunition Systems (PM CAS) : Picatinny Arsenal, NJ	-	-		-		1.000	Oct 2020	-		1.000	0.000	1.000	-
Subtotal			-	-		-		1.000		-		1.000	0.000	1.000	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DPICM Replacement Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : Picatinny Arsenal, NJ	-	-		-		19.700	Dec 2020	-		19.700	0.000	19.700	-
Subtotal			-	-		-		19.700		-		19.700	0.000	19.700	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	-	-		-		4.400	Oct 2020	-		4.400	0.000	4.400	-
Subtotal			-	-		-		4.400		-		4.400	0.000	4.400	N/A

Remarks
Engineering support includes fire control software and firing table development required for qualification testing.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DPICM Replacement Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		-		2.500	Mar 2021	-		2.500	0.000	2.500	-
Subtotal			-	-		-		2.500		-		2.500	0.000	2.500	N/A
Project Cost Totals			-	-		0.000		27.600		-		27.600	0.000	27.600	N/A

Remarks
C-DAEM DPICM Replacement will destroy personnel to light-skinned vehicles.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025																			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																
Armor Engineering Manufacturing & Development (EMD)																																												
Armor Critical Design Review													EMD																1 CDR								2 MS-C							
Armor Milestone C																																												
DPICM Replacement Qualification and Testing																																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FJ4 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Armor Engineering Manufacturing & Development (EMD)	1	2022	4	2024
Armor Critical Design Review	2	2022	2	2022
Armor Milestone C	4	2024	4	2024
DPICM Replacement Qualification and Testing	1	2021	4	2023

Note

C-DAEM Armor will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM Dual Purpose Improved Conventional Munition (DPICM) Replacement will destroy personnel to light-skinned vehicles. C-DAEM Armor and DPICM Replacement are being developed simultaneously.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons			
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
FL4: Small Caliber Ammo for Next Gen Squad Weapons	-	0.000	18.180	30.600	-	30.600	28.723	24.976	11.739	11.858	0.000	126.076
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Small Caliber Ammo for Next Gen Squad Weapons project is a critical technology development in response to the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) for the ammunition required to support the rapid prototyping, development, and fielding of the Next Generation Squad Weapons (NGSW) under the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. The objective is to develop and Full Materiel Release (FMR) the new ammunition in parallel with the NGSW rifle and automatic rifle. The NGSW ammunition is split into two initial projectile variants, the General Purpose (GP) and the Special Purpose (SP). Fiscal Year (FY) 2021 funding supports continuing rapid prototyping/development of the GP projectile, building prototypes and delivering prototypes to the weapon system contractors for integration into the weapon system development, conducting prototype testing and engineering testing. FY 2021 also supports continuing rapid prototyping for the SP projectile, conducting a Critical Design Review (CDR), conducting prototype testing and engineering testing. FY 2021 supports development of prototype solutions for the Reduced Range Ammunition (RRA) variant; to include building and evaluating RRA concepts/designs, and conducting a Preliminary Design Review (PDR). FY 2021 also includes development efforts to evaluate competing concepts/solutions for the tracer ammunition variant required for the NGSW; including maturing/refining tracer ammunition designs and performing engineering tests. FY 2021 supports initial activities to evaluate potential solutions/prototypes and concepts to satisfy follow-on NGSW ammunition requirements. Follow-on NGSW ammunition types includes: Blank and Close Combat Mission Capability Kit (CCMCK) training ammunition. Development efforts on the follow-on NGSW ammunition variants will continue into FY 2022. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Rapid Prototyping GP	-	12.449	10.500	-	10.500
Description: Develop, demonstrate, and qualify new ammunition for the NGSW systems.					
FY 2020 Plans: FY 2020 efforts were focused on continuing rapid prototyping/development of the GP projectile, building prototypes and maturing prototypes to provide to the weapon system contractors for performance evaluation, conducting a CDR, and conducting prototype testing.					
FY 2021 Base Plans: Continuing rapid prototyping/development of the GP projectile, build prototypes and deliver prototypes to the weapon system contractors for integration into the weapon system development and conduct prototype testing					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
and engineering testing. Evaluate prototype weapon systems from three contractors, conduct system level CDR, and down-select to one weapon system. FY 2020 to FY 2021 Increase/Decrease Statement: Based on planned activities.					
Title: Rapid Prototyping SP Description: Develop, demonstrate, and qualify new ammunition to defeat hard targets for the NGSW systems. FY 2020 Plans: FY 2020 efforts focused on continuing Rapid Prototyping for the Special Purpose projectile, conducting a Preliminary Design Review (PDR), conducting an Initial Product Review, and performing activities to increase prototype capacity to support planned weapon system. FY 2021 Base Plans: Continuing rapid prototyping for the Special Purpose (SP) projectile, conduct a Critical Design Review (CDR), and conduct prototype testing and engineering testing in preparation for cartridge system integration with weapons systems from three contractors. FY 2020 to FY 2021 Increase/Decrease Statement: Based on planned activities.	-	3.810	14.100	-	14.100
Title: Rapid Prototyping Reduced Range Ammunition (RRA) for NGSW Description: Develop and qualify RRA for the NGSW that will satisfy the requirement to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. FY 2020 Plans: Conducted an Initial Product Review (IPR), assessed initial prototypes, and performed preparation activities to begin the rapid prototyping RRA effort. FY 2021 Base Plans: Begin rapid prototyping effort to develop RRA for the NGSW. Develop and mature RRA projectile concepts, award prototype development contract, investigate manufacturing processes, build and evaluate concept/ prototype RRA ammunition. And, conduct a PDR in preparation for cartridge integration. FY 2020 to FY 2021 Increase/Decrease Statement:	-	0.095	3.500	-	3.500

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020			
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Planned activities to satisfy the RRA ammunition requirement.						
Title: Rapid Prototyping Tracer Ammunition for NGSW						
Description: Rapid prototyping effort to develop and field tracer ammunition for the NGSW systems by building and evaluating competing tracer ammunition designs/concepts then down-selecting to a final tracer design.						
FY 2021 Base Plans: Will begin rapid prototyping effort to develop tracer ammunition for the NGSW. Build and evaluate competing tracer ammunition designs/concepts, down-select to a tracer ammunition design, begin the process of maturing/refining selected design by performing engineering tests and implementing improvements based upon test results.						
FY 2020 to FY 2021 Increase/Decrease Statement: Start of effort to satisfy the tracer requirement.						
		-	-	1.500	-	1.500
Title: Concept Evaluation of other NGSW Ammunition Variants						
Description: Concept development/evaluation of follow-on variants / ammunition for the NGSW.						
FY 2020 Plans: Explored/evaluated ammunition prototypes and concepts of follow-on ammunition for the NGSW. Follow-on NGSW ammunition types included: tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition.						
FY 2021 Base Plans: The follow-on variations of the ammunition for the various concepts will be developed and fabricated in support of engineering development, safety, prototype system testing. A system Design Review anticipated in 1QFY21 and a user assessment scheduled for 3QFY21. Follow-on NGSW ammunition types included: tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition.						
		-	1.000	1.000	-	1.000
Title: FY 2020 SBIR/STTR Transfer						
Description: Funding transferred in accordance with Title 15 USC 638						
FY 2020 Plans:						
		-	0.826	-	-	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC 638					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	-	18.180	30.600	-	30.600

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	5.334	6.821	0.000	-	0.000	-	-	-	-	0.000	12.155
• EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	20.247	-	0.000	-	0.000	-	-	-	-	0.000	20.247
• E06002: NEXT GENERATION COMBAT ROUND	-	-	11.988	-	11.988	20.519	60.880	187.813	189.692	0.000	470.892

Remarks

Budget Activity (BA) 4 (Program Element (PE) 0603639A Tank and Medium Caliber Ammunition Project EC2 RDTE/Adv Armor-Piercing (ADVAP) for Small Cal Ammo: This funding line starts the rapid development/rapid prototyping work on the SP ammunition for the NGSW systems.

BA 5 PE 0604802A Weapons and Munitions - Eng Dev Project EP5 RDTE/Adv Armor-Piercing (ADVAP) for Small Caliber Ammo: This funding line starts the rapid prototyping/development work on the GP ammunition for the NGSW systems.

Procurement of Ammunition, Army E06001 / Next Generation Combat Round: This funding line supports the procurement of ammunition for the NGSW.

D. Acquisition Strategy

The NGSW ammunition program will utilize the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding to develop ammunition concepts/designs for the GP variant and the SP variant. The project will utilize Government developed projectile designs that will be delivered to development contractors as Government Furnished Material (GFM). The Government will select up to three contractors for the weapon system development and down-select to a single contractor in FY 2021, prior to production contract award; with a planned Urgent Materiel Release (UMR) in FY 2022 and FMR in FY 2024. Development effort for the Reduced Range and Tracer ammunition will follow a similar strategy beginning in FY 2021. Follow-on development efforts for additional NGSW ammunition variants including blank and CCMCK ammunition will start in FY 2022.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FL4 / Small Caliber Ammo for Next Gen Squad Weapons							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.826		-		-		-	0.000	0.826	-
Subtotal			-	-		0.826		-		-		-	0.000	0.826	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Follow-on Ammo Prototypes/Concepts	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		0.125	Oct 2019	0.200	Oct 2020	-		0.200	Continuing	Continuing	Continuing
Projectile and Ammo Development Contract General Purpose	Option/CPFF	OLIN Winchester Corporation (LCAAP) : Lake City, Missouri	-	-		6.924	Jan 2020	5.000	Nov 2020	-		5.000	Continuing	Continuing	Continuing
Projectile and Ammo Development Contract Special Purpose	Option/CPFF	OLIN Winchester Corporation (LCAAP) : Lake City, Missouri	-	-		1.925	Jan 2020	7.000	Nov 2020	-		7.000	Continuing	Continuing	Continuing
Tracer Ammunition Prototype Contract	TBD	To Be Determined : To Be Determined	-	-		-		0.750	Jan 2021	-		0.750	Continuing	Continuing	Continuing
Reduced Range Ammunition Prototype Contract 1	TBD	To Be Determined : To Be Determined	-	-		-		1.000	Jan 2021	-		1.000	Continuing	Continuing	Continuing
Reduced Range Ammunition Prototype Contract 2	TBD	To Be Determined : To Be Determined	-	-		-		1.000	Jan 2021	-		1.000	Continuing	Continuing	Continuing
Subtotal			-	-		8.974		14.950		-		14.950	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FL4 / Small Caliber Ammo for Next Gen Squad Weapons							
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Development and Prototyping Special Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		1.425	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Projectile Development and Support General Purpose	MIPR	Army Research Lab : Aberdeen, Maryland	-	-		0.675	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Tracer Ammunition Development and Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		0.350	Oct 2020	-		0.350	Continuing	Continuing	Continuing
Reduced Range Ammunition Prototype and Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		0.025	Jul 2020	1.000	Oct 2020	-		1.000	Continuing	Continuing	Continuing
Projectile Development and Support General Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		3.655	Oct 2019	2.000	Oct 2020	-		2.000	Continuing	Continuing	Continuing
Projectile Development and Support Special Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		5.150	Oct 2020	-		5.150	Continuing	Continuing	Continuing
Subtotal			-	-		5.780		8.500		-		8.500	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Prototype Testing CCDC Armaments Center General Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		0.825	Oct 2019	-		-		-	Continuing	Continuing	Continuing
U.S. Army Aberdeen Test Center (ATC) General Purpose	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		0.425	Oct 2019	0.900	Oct 2020	-		0.900	Continuing	Continuing	Continuing
U.S. Army Aberdeen Test Center (ATC) Special Purpose	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		0.425	Oct 2019	0.500	Oct 2020	-		0.500	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FL4 / Small Caliber Ammo for Next Gen Squad Weapons							
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Research Lab (ARL) Testing General Purpose	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		0.925	Oct 2019	1.300	Oct 2020	-		1.300	Continuing	Continuing	Continuing
Army Research Lab (ARL) Testing Special Purpose	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		-		1.250	Oct 2020	-		1.250	Continuing	Continuing	Continuing
Tracer Ammunition Engineering Tests	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		0.400	Oct 2020	-		0.400	Continuing	Continuing	Continuing
Reduced Range Ammunition Prototype Testing	MIPR	U.S. Army Aberdeen Test Center (ATC) : Aberdeen, Maryland	-	-		-		0.500	Oct 2020	-		0.500	Continuing	Continuing	Continuing
Engineering Tests General Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		1.300	Oct 2020	-		1.300	Continuing	Continuing	Continuing
Engineering Tests Special Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		1.000	Oct 2020	-		1.000	Continuing	Continuing	Continuing
Subtotal			-	-		2.600		7.150		-		7.150	Continuing	Continuing	N/A
Project Cost Totals			-	-		18.180		30.600		-		30.600	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Rapid Prototyping Effort	Rapid Prototyping																												
Initial Product Review 1 (IPR 1) Special Purpose	1 IPR 1 SP																												
Preliminary Design Review General Purpose (PDR-GP)		2 PDR-GP																											
Initial Product Review 2 (IPR 2) Special Purpose			3 IPR 2 SP																										
Preliminary Design Review General Purpose (PDR-SP)				4 PDR-SP																									
Critical Design Review General Purpose (CDR-GP)					5 CDR-GP																								
Prototype Test 1								PT1																					
Initial Product Review 3 (IPR 3) Special Purpose									6 IPR 3 SP																				
Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4										8 FMR BA04 to BA05 Transition																			
Critical Design Review Special Purpose (CDR-SP)											9 CDR-SP																		
Prototype Test 2												PT2																	
Engineering Tests													Engineering Tests																
Live Fire Test and Evaluation (LFT&E)													LFT&E																

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
Prototype & Manufacturing Integration (GP & SP)													Mfg Integration GP & SP																							
Urgent Materiel Release Special Purpose (UMR SP)																									13 UMR SP											
Urgent Materiel Release General Purpose (UMR GP)																									14 UMR GP											
Rapid Fielding																									Rapid Fielding											
Production Qualification Test Special Purpose (PQT SP)																									PQT SP											
Full Materiel Release (FMR)																													18 FMR							
Initial Product Review (IPR) Reduced Range Ammo (RRA)																	7 IPR RRA																			
Prototype Manufacturing Reduced Range Ammo (RRA)																					Prototype Manufacturing RRA															
Preliminary Design Review (PDR) Reduced Range Ammo (RRA)																					11 PDR-RRA															
Developmental Testing (DT) Reduced Range Ammo (RRA)																									DT-RRA											
Critical Design Review Reduced Range Ammo (CDR-RRA)																													15 CDR-RRA							
Product Qualification Testing Reduced Range Ammo (PQT-RRA)																													PQT-RRA							
Urgent Materiel Release Reduced Range Ammo (UMR RRA)																																	17 UMR-RRA			

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Initial Product Review (IPR) Tracer Ammo									10																			
Preliminary Design Review (PDR) Tracer Ammo									12																			
Safety Testing Tracer Ammo																												
Critical Design Review (CDR) Tracer Ammo									16																			
Protoypte Testing Tracer Ammo																												
Rapid Fielding Tracer Ammo																												
Materiel Release (MR) Tracer Ammo									19																			
Rapid Prototyping Blank and CCMCK Ammo (Follow-On Developmental Efforts)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FL4 / <i>Small Caliber Ammo for Next Gen Squad Weapons</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Rapid Prototyping Effort	1	2019	4	2026
Initial Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019
Preliminary Design Review General Purpose (PDR-GP)	3	2019	3	2019
Initial Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
Preliminary Design Review General Purpose (PDR-SP)	2	2020	2	2020
Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
Prototype Test 1	3	2020	4	2020
Initial Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4	2	2021	2	2021
Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
Prototype Test 2	2	2021	3	2021
Engineering Tests	2	2021	3	2021
Live Fire Test and Evaluation (LFT&E)	2	2021	3	2021
Prototype & Manufacturing Integration (GP & SP)	4	2021	3	2022
Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
Rapid Fielding	4	2022	4	2027
Production Qualification Test Special Purpose (PQT SP)	1	2023	2	2023
Full Materiel Release (FMR)	2	2024	2	2024
Initial Product Review (IPR) Reduced Range Ammo (RRA)	4	2020	4	2020
Prototype Manufacturing Reduced Range Ammo (RRA)	1	2021	3	2022
Preliminary Design Review (PDR) Reduced Range Ammo (RRA)	4	2021	4	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons
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Events	Start		End	
	Quarter	Year	Quarter	Year
Developental Testing (DT) Reduced Range Ammo (RRA)	4	2022	1	2023
Critical Design Review Reduced Range Ammo (CDR-RRA)	2	2023	2	2023
Product Qualification Testing Reduced Range Ammo (PQT-RRA)	2	2023	3	2023
Urgent Materiel Release Reduced Range Ammo (UMR RRA)	4	2023	4	2023
Initial Product Review (IPR) Tracer Ammo	4	2021	4	2021
Preliminary Design Review (PDR) Tracer Ammo	2	2022	2	2022
Safety Testing Tracer Ammo	1	2023	2	2023
Critical Design Review (CDR) Tracer Ammo	2	2023	2	2023
Protoypete Testing Tracer Ammo	3	2023	1	2024
Rapid Fielding Tracer Ammo	1	2024	4	2026
Materiel Release (MR) Tracer Ammo	4	2024	4	2024
Rapid Prototyping Blank and CCMCK Ammo (Follow-On Developmental Efforts)	4	2021	4	2026

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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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
S36: Precision Guidance Kit	-	27.155	30.500	33.365	-	33.365	22.396	12.960	4.995	3.326	0.000	134.697
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Precision Guidance Kit (PGK) M1156 is a course correcting fuze that provides precision accuracy and efficiency for current and future 155 millimeter (mm) High Explosive (HE) projectiles by eliminating a portion of the inherent errors associated with ballistic firing solutions, which effectively reduces the number of projectiles required to execute fire missions. PGK utilizes a Global Positioning System (GPS) receiver and internal Guidance and Navigation Computer to accomplish its mission with point detonating and height of burst fuzing functions. The PGK M1156E1 development effort, Long Range-PGK (LR-PGK), will qualify state of the art technologies for operation in GPS degraded environments and compatibility with Army Modernization objectives under the Long Range Precision Fires Cross Functional Team's (LRPF CFT) new long range cannon, Extended Range Cannon Artillery (ERCA). The ERCA and its new long range projectiles require the LR-PGK to meet lethality requirements, and will be fielded during the PGK Life Cycle. LR-PGK supports the Army's modernization priorities in support of the National Defense Strategy and future 155mm projectiles and M777 Long Range Cannon (LRC) initiatives. Fiscal Year (FY) 2021 funding supports the award of a follow-on Engineering and Manufacturing Development (EMD) contract for system design and prototype development for LR-PGK.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Contractor - EMD</p> <p>Description: Work performed by contractor(s) in support of PGK development.</p> <p>FY 2020 Plans: Supported EMD activities including prototype development, build and test activities as well as tactical guided flight testing in the threat environment.</p> <p>FY 2021 Base Plans: EMD activities including prototype development, build and test activities as well as tactical guided flight testing in the threat environment.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 increase to support Army modernization requirements to achieve lethality at 70 kilometers (km) with precision accuracy by FY 2023.</p>	23.585	26.224	29.333	-	29.333
<p>Title: Government and Engineering Support</p> <p>Description: Work performed by the United States Government (USG) to support PGK development.</p>	2.413	2.353	2.557	-	2.557

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: Provided engineering support of development, build and test activities which included prototype and tactical guided flight testing.</p> <p>FY 2021 Base Plans: Engineering support of development, build and test activities which will include prototype and tactical guided flight testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 Government and Engineering Support decrease due to additional Development/Operational Testing costs.</p>					
<p>Title: Development/Operational Testing</p> <p>Description: Specific development and operational testing activities to validate technology maturation.</p> <p>FY 2020 Plans: Provided engineering support of development, build and test activities which included prototype and tactical guided flight testing.</p> <p>FY 2021 Base Plans: Engineering support of system development test activities which will include prototype and tactical guided flight testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 increase due to additional test activities to support Army modernization requirements to achieve lethality at 70km with precision accuracy by FY 2023.</p>	1.157	0.538	1.475	-	1.475
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638</p>	-	1.385	-	-	-
Accomplishments/Planned Programs Subtotals	27.155	30.500	33.365	-	33.365

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>			<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• E99250: <i>FUZE, 155mm ARTY Precision Guidance Kit (PGK)</i>	217.933	160.596	139.036	21.675	160.711	79.034	72.523	76.029	85.629	Continuing	Continuing

Remarks

Procurement of Ammunition, Army (PAA) funding for M1156 (NA36) through FY 2023 with transition to LR-PGK M1156E1 (NZ04) in FY 2024.

D. Acquisition Strategy

The PGK is a GPS guidance kit with fuzing functions for 155mm HE artillery projectiles. PGK provides precision accuracy and effectiveness for 155mm HE projectiles. The PGK corrects the inherent errors associated with ballistic firing solutions and reduces the number of artillery projectiles required to execute the mission. The current PGK Increment has been qualified for the M795 and M549A1 HE projectiles. This increment of PGK entered Low Rate Initial Production (LRIP) at Milestone C in March 2013. Initial Operational Test and Evaluation (IOT&E) was completed in FY 2015, Full Material Release (FMR) was approved in FY 2016, Full Rate Production (FRP) decision and Initial Operational Capability (IOC) occurred FY 2016. Follow-on LR-PGK development efforts are focused on addressing performance in GPS degraded environments as well as ensuring compatibility with the Army's new long range 155mm cannon and projectiles, which are scheduled to be fielded in the same timeframe as the new increment of PGK. The contracting strategy includes competitive DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) concept development efforts with multiple contractors in FY 2017, followed by a DOTC Risk Reduction concept maturation phase in FY 2018 through FY 2019. Down-select to one system contractor and EMD DOTC contract award will occur in FY 2020. Demonstration efforts to support Milestone C will continue through 2023. The Program will transition to a Federal Acquisition Regulation (FAR) based production contract after Milestone C for LRIP in FY 2024 and FRP in FY 2025.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Office	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	13.947	0.048	Oct 2018	0.060	Dec 2019	0.100	Oct 2020	-		0.100	0.000	14.155	14.067
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.385		-		-		-	0.000	1.385	-
Subtotal			13.947	0.048		1.445		0.100		-		0.100	0.000	15.540	N/A

Remarks
Program Management support includes LR-PGK travel and documentation support. Fiscal Year (FY) 2021 increase to support additional testing activities.

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DOTC - LR-PGK Engineering and Manufacturing Development (EMD) - TBD	C/CPAF	TBD : TBD	-	-		25.646	Mar 2020	29.333	Mar 2021	-		29.333	0.000	54.979	33.046
DOTC - PGK GPS Anti-Jam Development - GD-OTS	MIPR	DoD Ordnance Technology (DOTC) - General Dynamics Ordnance & Tactical Systems : Bothell, WA	7.416	6.072	Feb 2019	-		-		-		-	0.000	13.488	7.167
DOTC - PGK GPS Anti-Jam Development - BAE	MIPR	DoD Ordnance Technology (DOTC) - BAE Systems / Rokar : Minneapolis, MN	7.274	7.187	May 2019	-		-		-		-	0.000	14.461	7.167
DOTC - PGK GPS Anti-Jam Development - L3 IEC	MIPR	DOD Ordnance Consortium (DOTC) - L3 - IEC : Various	3.341	10.326	Jan 2019	-		-		-		-	0.000	13.667	10.551

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			18.031	23.585		25.646		29.333		-		29.333	0.000	96.595	N/A

Remarks

FY 2021 increase to support Army modernization requirements to achieve lethality at 70km with precision by FY 2023.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	36.183	2.365	Oct 2018	2.409	Dec 2019	2.457	Oct 2020	-		2.457	0.000	43.414	41.412
Subtotal			36.183	2.365		2.409		2.457		-		2.457	0.000	43.414	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Development Testing for GPS Anti-Jam	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	1.146	1.032	Jan 2019	1.000	Aug 2020	-		-		-	0.000	3.178	2.896
System Development Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	10.442	-		-		1.475	Aug 2021	-		1.475	0.000	11.917	10.442

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Other Development Testing	MIPR	Various : Various	1.769	0.125	May 2019	-		-		-		-	0.000	1.894	1.769
Subtotal			13.357	1.157		1.000		1.475		-		1.475	0.000	16.989	N/A

Remarks
FY 2021 increase due to additional test activities to support Army modernization requirements to achieve lethality at 70km with precision by FY 2023.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	81.518	27.155	30.500	33.365	-	33.365	0.000	172.538	N/A

Remarks
Defense Ordnance Technology Consortium (DOTC)
Long Range-Precision Guidance Kit (LR-PGK)
Engineering and Manufacturing Development (EMD)
Army Test and Evaluation Command (ATEC)

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) S36 / <i>Precision Guidance Kit</i>

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Technology Maturation and Risk Reduction (TMRR) and EMD	[Redacted]																															
	TMRR/ EMD																															
XM1113 / XM1128 / ERCA Requirements & Design Updates	[Redacted]																															
	New Requirements & Design Updates																															
Source Selection					[Redacted]																											
					Source Selection																											
Contract Award					▲ 1 Award																											
Prototype Development & Testing					[Redacted]																											
					Prototyping & Testing																											
System Requirements / System Functional Reviews					▲ 2 SRR / SFR																											
Preliminary Design Review (PDR)									▲ 3 PDR																							
Milestone B													▲ 4 MS-B																			
Critical Design Review (CDR)													▲ 5 CDR																			
Qualification Testing													[Redacted]																			
													Qualification Testing																			
ERCA Increment 1C First Unit Issues (FUI)																					▲ 6 ERCA Inc 1C FUI											
Milestone C																					▲ 7 MS-C											
Initial Operation Test and Evaluation (IOT&E)																					[Redacted]											
																					IOT&E											

Note
Several knowledge points pushed out to extend Engineering and Manufacturing Development (EMD) Prototype Development and Testing phase due to additional Army modernization requirements to achieve lethality at 70 kilometer (km) with precision accuracy by Fiscal Year (FY) 2023.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Maturation and Risk Reduction (TMRR) and EMD	1	2019	1	2024
XM1113 / XM1128 / ERCA Requirements & Design Updates	1	2019	4	2020
Source Selection	4	2019	1	2020
Contract Award	2	2020	2	2020
Prototype Development & Testing	2	2020	2	2022
System Requirements / System Functional Reviews	3	2020	3	2020
Preliminary Design Review (PDR)	2	2021	2	2021
Milestone B	2	2022	2	2022
Critical Design Review (CDR)	2	2022	2	2022
Qualification Testing	2	2022	1	2024
ERCA Increment 1C First Unit Issues (FUI)	4	2023	4	2023
Milestone C	1	2024	1	2024
Initial Operation Test and Evaluation (IOT&E)	1	2024	2	2025

Note

Engineering and Manufacturing Development (EMD)

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach
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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
XT2: 40mm Door Breach	-	0.000	0.000	3.023	-	3.023	0.000	0.000	0.000	0.000	0.000	3.023
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

This is a new start in FY2021.

Project XT2 40 millimeter (mm) Door Breach (DB) is a new start in Fiscal Year (FY) 2021.

A. Mission Description and Budget Item Justification

The 40mm Low Velocity (LV) Door Breach (DB), XM1167, cartridge allows the grenadier to conduct a ballistic breach of an existing door to create an entry point into a building or other structure. This capability is critical during Urban Operations, while having stand-off ability to conduct ballistic breach at ranges up to 50 meters away, with a single-shot, and without pause between actual breach and entry of initial force. The 40mm DB cartridge will provide the small unit with the capability to conduct efficient breaching operations; allowing the Warfighter to create an entry point into a structure for an assault element to enter and begin clearing operations, one of the most difficult types of operations that Soldiers may face in an urban environment. The 40mm DB cartridge will reduce collateral damage and friendly casualties associated with breaching operations. The deployment of 40mm DB cartridges will enable the small unit to gain and maintain a tactical advantage through efficiency of combat power and momentum. FY 2021 will consist of Developmental Testing and Evaluation (DT&E) efforts for the purpose of qualifying the Door Breach cartridge design.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 40mm LV DB, XM1167	-	-	3.023	-	3.023
Description: Engineering and Manufacturing Development (EMD) Activities.					
FY 2021 Base Plans: FY 2021 activities include DT&E efforts.					
FY 2020 to FY 2021 Increase/Decrease Statement: Project XT2 40mm Door Breach is a new start in FY 2021.					
Accomplishments/Planned Programs Subtotals	-	-	3.023	-	3.023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach

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

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	Total Cost
			Base	OCO	Total					Complete	
• E71505: CTG, 40mm LV, Door Breach (DB)	-	-	0.000	-	0.000	2.997	2.997	-	-	0.000	5.994

Remarks

D. Acquisition Strategy

The DB cartridge development consists of characterization testing of multiple designs provided by industry which will be used to further inform a future down-select to a single design that will be taken through DT&E. Following DT&E, the program will proceed to Milestone C. After Milestone C, the program will enter into Low Rate Initial Production (LRIP) and conduct Final Hazard Classification (FHC) testing. The program will use the results of DT&E, LRIP and FHC testing to achieve Type Classification and Full Materiel Release in FY 2023.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Low Velocity (LV) Door Breach XM1167 Test Materials	C/CPFF	TBS : TBS	-	-		-		0.830	Jan 2021	-		0.830	0.000	0.830	-
Subtotal			-	-		-		0.830		-		0.830	0.000	0.830	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LV Door Breach XM1167 - Combat Capabilities Development Command - Armaments Center (CCDC-AC)	MIPR	Picatinny Arsenal : NJ	-	-		-		0.497	Dec 2020	-		0.497	0.000	0.497	-
Subtotal			-	-		-		0.497		-		0.497	0.000	0.497	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LV Door Breach XM1167 Developmental Test & Evaluation	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		-		1.696	Mar 2021	-		1.696	0.000	1.696	-
Subtotal			-	-		-		1.696		-		1.696	0.000	1.696	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-	0.000	3.023	-	3.023	0.000	3.023	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Low Velocity Door Breach XM1167 Test Hardware Builds																																
Low Velocity Door Breach XM1167 Developmental Test and Evaluation (DT&E)																																
Low Velocity Door Breach XM1167 Milestone C																																
Low Velocity Door Breach XM1167 Final Hazard Classification Testing (FHC)																																
Low Velocity Door Breach XM1167 Low Rate Initial Production Award (LRIP)																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Low Velocity Door Breach XM1167 Test Hardware Builds	1	2021	2	2021
Low Velocity Door Breach XM1167 Developmental Test and Evaluation (DT&E)	3	2021	4	2021
Low Velocity Door Breach XM1167 Milestone C	1	2022	1	2022
Low Velocity Door Breach XM1167 Final Hazard Classification Testing (FHC)	1	2022	2	2022
Low Velocity Door Breach XM1167 Low Rate Initial Production Award (LRIP)	2	2022	2	2022