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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development							
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	-	75.845	145.232	183.100	-	183.100	153.853	142.606	94.042	49.891	0.000	844.569
613: MORTAR SYSTEMS	-	17.642	20.115	28.106	-	28.106	24.586	7.184	2.249	0.000	0.000	99.882
EC4: Non-Standard Simulator Munitions	-	0.000	2.839	3.150	-	3.150	2.644	2.121	2.159	0.000	0.000	12.913
ED7: Advanced Multipurpose (AMP) Cartridge	-	30.014	31.655	27.720	-	27.720	0.000	0.000	0.000	0.000	0.000	89.389
EL9: Ammunitions Logistics Prototyping	-	0.102	0.686	2.016	-	2.016	2.302	1.683	0.697	0.988	0.000	8.474
EP3: Reduced Range Ammunition - Small Caliber	-	0.000	0.000	2.473	-	2.473	8.280	14.826	10.129	8.003	0.000	43.711
EP4: One-Way Luminescence for Small Caliber Ammo	-	0.000	2.688	6.085	-	6.085	6.472	12.247	5.324	6.422	0.000	39.238
EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	-	12.452	11.571	21.019	-	21.019	4.783	13.953	6.918	6.446	0.000	77.142
EP7: Aviation Airborne Expandable Countermeasures	-	0.000	7.500	7.222	-	7.222	6.920	2.113	16.207	0.000	0.000	39.962
EU4: 40mm HV Improved High Explosive Dual Purpose	-	0.292	3.191	7.210	-	7.210	13.055	2.935	2.313	0.000	0.000	28.996
EU5: .50 Caliber All-Purpose Tactical cartridge (APTC)*	-	0.000	0.000	0.000	-	0.000	0.000	8.401	9.289	0.000	0.000	17.690
EU6: 155mm High Explosive Extended Range Artillery	-	0.000	0.000	6.926	-	6.926	4.943	2.966	0.000	0.000	0.000	14.835
EU7: Enhanced Lethality Cannon Munitions	-	0.000	20.500	7.915	-	7.915	7.908	7.907	0.000	0.000	0.000	44.230
EU8: Improved Multi-Option Fuze	-	0.000	8.000	7.915	-	7.915	9.885	0.000	0.000	0.000	0.000	25.800
EW1: 40mm Low Velocity Ammunition	-	0.000	9.678	13.269	-	13.269	14.032	21.302	1.482	0.000	0.000	59.763

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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 Engineering Development								
FA6: 30mm Lethality	-	0.000	12.000	13.851	-	13.851	8.897	11.860	6.918	0.000	0.000	53.526	
S36: Precision Guidance Kit	-	15.343	14.809	28.223	-	28.223	30.150	25.695	20.178	17.757	0.000	152.155	
XT6: 30mm Anti-Personnel and Counter-Air - Eng Dev*	-	0.000	0.000	0.000	-	0.000	8.996	4.942	4.941	4.940	0.000	23.819	
XV2: Extended Range 120mm Mortar*	-	0.000	0.000	0.000	-	0.000	0.000	2.471	5.238	5.335	0.000	13.044	

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2019

Note

In FY 2019, Program Element (PE) 0603639A, Project EL7, Reduced Range Ammunition will transition to PE 0604802A, Project EP3, Reduced Range Ammunition - Small Caliber. This Project is not a New Start.

In FY 2019, PE 0603639A, Project EU1, Enhanced Lethality Cannon Munitions will transition to PE 0604802A, Project EU6, 155mm High Explosive Extended Range Artillery. This Project is not a New Start.

A. Mission Description and Budget Item Justification

This Program Element funds multiple efforts for engineering development of weapons and munitions systems.

Project 613: This Project supports both the High Explosive Guided Mortar (HEGM) and the Weaponized Universal Lightweight Fire-control (WULF).

The High Explosive Guided Mortar (HEGM) project funds engineering development of precision guidance systems applicable to Indirect Fire mortar weapon systems. HEGM provides a precision capability to support the close fight in urban and complex terrain, while at the same time, reducing collateral damage. HEGM provides precision accuracy and effectiveness for 120mm mortar systems using precision guidance systems that will effectively reduce target delivery error. The HEGM capability will be developed through the use of improved guidance and control components and advanced airframe design that allow sufficient maneuver of the cartridge in flight to correct for induced error providing the ability to engage targets without the need to adjust fire.

The Weaponized Universal Lightweight Fire-control (WULF) project funds engineering development of fire-control systems applicable to Indirect Fire mortar weapon systems. WULF is a digital sight integrated with digital fire-control that is designed for aiming of the M252 81mm mortar system and other man portable mortar systems (60mm and 120mm). The digital sight unit and Fire Control will allow the Soldier to emplace the mortar systems faster and fire more accurately. WULF will improve the accuracy of the M252 mortar.

Project EC4: This project will standardize various pyrotechnic 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, 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

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<p>terrain; Micro pyrotechnics to simulate indoor hostile fire and IED effects that are capable of being integrated into existing facilities; Rocket Propelled Grenade (RPG) on a wire to replicate the flight of a Rocket Propelled Grenade; High Order Blast Effect (HOBE) used to replicate a Vehicle Borne Improvised Explosive Device (VBIED), building explosions, and other significant explosive events; Artillery airburst (LA45) simulator to replicate indirect fire; simulator to replicate a STINGER (LA47) firing; Tracer Fire-back simulator to replicate enemy small arms fire and anti-aircraft fire. Standardization will reduce training costs, eliminate redundancies between systems, mitigate environmental concerns and safety risks associated with realistic scenario based training.</p> <p>Project ED7: The Advanced Multi Purpose (AMP) program is 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 Anti Tank Guided Missile (ATGM) teams from 50m to 2000m (T) and 50m to 4500m (O), 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 breech modification, the same required by the 120mm M829A4 cartridge that achieved Milestone C in FY 2014 and achieved Full Materiel Release in FY 2015. FY 2019 will support the continuation of Engineering and Manufacturing Development (EMD) Phase 2 and transition into Low Rate Initial Production (LRIP). This includes the completion of the Developmental Test and Evaluation (DT&E) cartridge build, initiation and completion of DT&E, and Milestone C. Continue to evaluate the scalability for future combat platforms. Conduct fuze risk reduction effort with potential second source supplier. Demonstrate feasibility of a training round for AMP.</p> <p>Project EL9: This 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 2019 funding will be used to integrate the munitions health monitoring system and continue to integrate passive time/temperature exposure sensors with additional developmental ammunition items and conduct qualification tests for both.</p> <p>Project EP3: The small caliber Reduced Range Ammunition (RRA) Project is a critical technology development in response to the 7.62mm 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. FY 2019 funding will support Milestone (MS) B activities to include Request for Proposal (RFP), Preliminary Design Review (PDR) and Engineering and Manufacturing Development (EMD) Contract Award for the 7.62mm caliber variant. Funding will also explore lessons learned from the Marine Corp .50 Caliber Reduced Range Ammunition effort and other various options to satisfy the .50 Caliber reduced range requirement.</p>		

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<p>Project EP4: The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62mm 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. OWL projects objective is to develop and field a full day/night 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. 7.62mm is the immediate focus followed by 5.56mm OWL cartridges and later followed by .50 Caliber cartridges. FY 2019 funding will support post Milestone B (MS B) activities to include Engineering and Manufacturing Development (EMD), Design Verification Testing (DVT), Preliminary Design Review (PDR), and a User Assessment (UA) for the 7.62mm caliber ammunition.</p> <p>Project EP5: This project supports both the Advanced Armor-Piercing ammunition and the Next Generation Squad Weapon (NGSW) Family of Ammunition.</p> <p>Advanced Armor-Piercing (ADVAP): The ADVAP project is a critical technology development in response to the 7.62mm 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 objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. FY 2019 funding supports continuation of Engineering and Manufacturing Development (EMD) efforts and activities to accelerate the project.</p> <p>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 Full Materiel Release (FMR) the new ammunition. FY 2019 funding supports Engineering and Manufacturing Development (EMD) efforts and activities to accelerate the project for the Enhanced Performance Round (EPR) variant and the Advanced Armor-Piercing (ADVAP) variant. Follow-on development efforts for additional NGSW ammunition variants including tracer ammunition, blank ammunition, and reduced range ammunition will start in FY 2022.</p> <p>Project EP7: This project will support Integrated System Design (ISD), System Capability (SC) and Manufacturing Process Demonstrations (MPD) on current pyrotechnic munitions and tunable pyrotechnic aircraft counter measures and decoys. 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, engineering to reduce size and weight, 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, pen flares, hand held signals, trip flares, simulators, marine markers, smoke pots, smoke grenades, rail road flares and other type of emergency/distress devices, aircraft expendables (to include Radio Frequency (RF) expendables), and primers used in munitions systems.</p> <p>Project EU4: 40mm Improved High Explosive Dual Purpose (I-HEDP) is a new capability identified as a Warfighter requirement in the 40mm High Velocity I-HEDP Capability Development Document (CDD). The I-HEDP tactical cartridge provides the warfighter with the ability to achieve the required lethal effects against enemy personnel in the open and to defeat personnel targets in defilade position. Additionally, the I-HEDP cartridge will be able to defeat unarmored and lightly armored vehicles. FY 2019 funding supports Engineering and Manufacturing Development (EMD) activities including source selection, contract award, Design Engineering Tests (DET), and technical design.</p>		

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<p>Project EU6: The 155mm High Explosive Extended Range Artillery Projectile project will evaluate, develop and qualify extended range technologies, including the XM1113 in 39 caliber weapon systems with legacy propellants. The XM113 effort is a government owned materiel solution for long-range cannon artillery projectile that will increase range by 10km+ in 39 caliber weapon systems, and contain twice as much rocket motor grains as the current 155mm long range cannon projectile that is now obsolete. The XM1113 will leverage enhanced lethality cannon munition technologies to compensate for increased rocket motor volume. This design will utilize a high fragmentation steel body with a streamlined ogive and a high performance rocket motor. The projectile body is filled with an insensitive munition (IM) high explosive (HE) and a supplementary charge. FY 2019 will support the completion of the Developmental Test phase of Engineering & Manufacturing Development (EMD) and the completion of the Critical Design Review (CDR) in 4Q FY 2019.</p> <p>Project EU7: The Enhanced Lethality Cannon Munitions (ELCM) project will accelerate the qualification of Lithographic Fragmentation Technology (LFT) on the 155mm XM1128 high explosive projectile, per HQDA G-8 Directed Requirement for a Rapid Bridging Solution for the 155mm Dual Purpose Improved Conventional Munition 22 December 2016. The project addresses requirements for increased lethality of 155mm high explosive unitary projectiles (Initial Draft Requirements for the XM1128 with Lithographic Fragmentation Technology, 24 February 2017). The ELCM project will also 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 will support testing of the Israeli Military Industries (IMI) Systems M999 advanced cluster munition, per HQDA G-8 Directed Requirement for a Rapid Bridging Solution for the 155mm Dual Purpose Improved Conventional Munition 22 December 2016. The project will complete a lethality arena test on the M999 submunitions to be conducted at the IMI facility in Israel. FY 2019 will support the completion of the Product Qualification Testing (PQT) test series for the XM1128 and the finalization of the Capability Production Document (CPD) by 4Q FY 2019.</p> <p>Project EU8: The Improved Multi-Option Fuze project will integrate the results of Budget Activity 04, Program Element 0603639A, Project EU2 and qualify/Type Classify (TC) new improved Multi-Option Fuzes (iMOFA/iMOFM) with Government-owned Next Generation Proximity Sensor (NGPS) capabilities containing built-in exportability attributes previously matured via OSD-sponsored tech base efforts under the Joint Fuze Technology Program and Defense Exportability Features (DEF) Congressional Pilot Program. Continuing FMS sales of non-precision artillery and mortar ammunition fuzes containing proximity technology will increase the incidence of reverse engineering (RE) and threat of electronic countermeasures (ECM). If realized, these threats will negate the current battlefield advantages of U.S. troops. The pending policy-driven loss of Cannon DPICM will further increase the importance of NGPS / Height of Burst (HoB) fuzing capabilities to efficiently engage enemy target sets. This Project will develop and qualify safe, affordable, reliable Proximity/HoB fuzing solution for non-precision Cannon artillery and Mortar munitions that are resistant to adversary exploitation via ECM and RE threats.</p> <p>Project EW1: 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 40mm LV HEAB tactical cartridge allows the warfighter to engage targets at increased effective ranges using the 40mm M203/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 at increased effective ranges with greater accuracy and lethality. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel at increased ranges 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 2019 supports Engineering and Manufacturing Development (EMD) effort for competing prototypes and continues EMD design activities.</p>		

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<p>The 40mm Low Velocity (LV) Door Breach (DB), XM1167, cartridge allows the grenadier to conduct a ballistic breach of an existing door creating 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 breaching operations; allowing the Warfighter to create an entry point in a structure allowing an assault element to enter and begin clearing operations, which is the most difficult type of operation 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 2019 supports Design Engineering Testing (DET) and Developmental Test and Evaluation (DT&E).</p> <p>Project FA6: The 30mm Lethality Project funds development of a suite of 30x173mm caliber cartridges, which includes anti-personnel tactical and training cartridges and anti-materiel tactical and training cartridges. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV) and any Army Fighting Vehicles that are equipped with a 30x173mm weapon system. The tactical cartridges will provide an organic direct fire capability to support infantry at a greater range and will improve lethality when engaging dismounted infantry and like armored vehicles. 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 for Increased Lethality. FY 2019 funding will continue to support the ammunition qualification activities and development of performance specifications in support of the 30x173mm Programmable Airburst Munitions - Tracer (PABM-T) Urgent Materiel Release (UMR). FY 2019 effort also includes activities for developing/qualifying a 30x173mm Programmable Airburst Munition (PABM) along with an initial Design Engineering Test (DET). The objective is to field airburst capable 30x173mm cartridges and programming/communication units for use in Stryker ICV and/or Army Future Fighting Vehicles.</p> <p>Project S36: The Precision Guidance Kit (PGK) is a course correcting fuze that provides near 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 effort will incorporate and qualify state of the art technologies to increase the functionality of PGK in GPS degraded environments as well as compatibility with the Army's new long range cannon and projectiles which will be fielded during the PGK Life Cycle.</p>		

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2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)		PE 0604802A / Weapons and Munitions Engineering Development			
B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	99.165	145.232	147.492	-	147.492
Current President's Budget	75.845	145.232	183.100	-	183.100
Total Adjustments	-23.320	0.000	35.608	-	35.608
• Congressional General Reductions	-0.040	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.480	-			
• Adjustments to Budget Years	-	-	35.608	-	35.608
• Budget Adjustments - Unrealized FY17 RAA	-18.800	-	-	-	-

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Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) 613 / MORTAR SYSTEMS			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
613: MORTAR SYSTEMS	-	17.642	20.115	28.106	-	28.106	24.586	7.184	2.249	0.000	0.000	99.882
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The High Explosive Guided Mortar (HEGM) project funds engineering development of precision guidance systems applicable to Indirect Fire mortar weapon systems. HEGM provides a precision capability to support the close fight in urban and complex terrain, while at the same time, reducing collateral damage. HEGM provides precision accuracy and effectiveness for 120mm mortar systems using precision guidance systems that will effectively reduce target delivery error. The HEGM capability will be developed through the use of improved guidance and control components and advanced airframe design that allow sufficient maneuver of the cartridge in flight to correct for induced error providing the ability to engage targets without the need to adjust fire.												
The Weaponized Universal Lightweight Fire-control (WULF) project funds engineering development of fire-control systems applicable to Indirect Fire mortar weapon systems. WULF is a digital sight integrated with digital fire-control that is designed for aiming of the M252 81mm mortar system and other man portable mortar systems (60mm and 120mm). The digital sight unit and Fire Control will allow the Soldier to emplace the mortar systems faster and fire more accurately. WULF will improve the accuracy of the M252 mortar.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: HEGM								15.719	17.780	28.106	-	28.106
Description: Engineering and Manufacturing Development Phase (EMD).												
FY 2018 Plans:												
Project in the Preliminary Design EMD phase. Activities will include Preliminary Design Review (PDR), award of follow on developmental efforts, and initiation of detailed design phase.												
FY 2019 Base Plans:												
Project continues in the Detailed Design EMD phase. Activities will include System Design Review (SDR), award of follow on developmental efforts, and initiation of Production Prove Out phase.												
FY 2018 to FY 2019 Increase/Decrease Statement:												
FY 2019 full and open FAR based contract award for detailed design phase to achieve Critical Design Review (CDR) and deliver hardware for qualification testing.												
Title: WULF								1.923	2.335	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions)											
						FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	
Description: Engineering development and software integration. FY 2018 Plans: Project in the Preliminary Design EMD phase. Activities will include Preliminary Design Review, engineering development, and software refinement of matured prototype to support the off Line-Replacement-Unit Environmental test and Software Development Engineering testing. FY 2018 to FY 2019 Increase/Decrease Statement: Efforts will focus on technology maturation and software development in preparation for full development and qualification in FY 2020 and FY 2021.											
Accomplishments/Planned Programs Subtotals						17.642	20.115	28.106	-	28.106	
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• E25511: <i>HEGM</i>	-	-	0.000	-	0.000	-	18.075	25.004	53.996	Continuing	Continuing
• K99200: <i>Computer Ballistics: LHMBC XM32</i>	5.924	8.117	8.553	0.960	9.513	8.151	7.564	7.487	7.492	0.000	54.248
Remarks .											
D. Acquisition Strategy HEGM - The Acquisition Strategy was approved by the Milestone Decision Authority (MDA) in 2Q FY 2017. HEGM will be procured using a Performance Specification (P-Spec). The strategy will use a DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiative and a Federal Acquisition Regulations (FAR) contract. The DOTC OTA initiative resulted in multiple awards to cover the Preliminary Design Phase requirements for FY 2017. A single Full and Open FAR contract is anticipated to be awarded for the completion of EMD, Low Rate Initial Production (LRIP) and first 3 years of Full Rate Production (FRP). WULF - Was developed under the U.S. Army Armament Research, Development and Engineering Center (ARDEC) Science & Technology initiative and currently assessed at Technology Readiness Level (TRL) 6 maturity (prototype demonstrated in a relevant environment). An Acquisition Decision Memorandum (ADM) was approved in 3Q FY 2017 by PEO Ammunition. The project is managed as a Modification Work Order (MWO) to M252A1 with a tailored Acquisition Strategy, leveraging existing FIRECON-F and/or DOTC contract to multiple vendors.											

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E. Performance Metrics N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
HEGM System Engineering Phase 1	MIPR	DoD Ordnance Technology Consortium (DOTC) - General Dynamics OTS : Bothell, WA	-	4.413	Jun 2017	0.750	Jan 2018	-		-		-	0.000	5.163	5.163
HEGM System Engineering Phase 1	MIPR	DoD Ordnance Technology Consortium (DOTC) - BAE Systems : Nashu, NH	-	4.413	Jun 2017	0.750	Jan 2018	-		-		-	0.000	5.163	5.163
HEGM System Engineering Phase 1	MIPR	DoD Ordnance Technology Consortium (DOTC) - Orbital ATK : Plymouth, MN	-	4.413	Jun 2017	0.750	Jan 2018	-		-		-	0.000	5.163	5.163
HEGM System Development Phase 2	C/CPIF	TBD : TBD	-	-		11.105	Jun 2018	20.248	Jan 2019	-		20.248	0.000	31.353	44.593
HEGM - Fire Control	MIPR	Armament Reasech, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.115	Sep 2017	0.250	Mar 2018	2.800	Dec 2018	-		2.800	0.000	3.165	-
WULF System Development	C/CPFF	TBD : TBD	-	1.100	Sep 2017	0.741	Mar 2018	-		-		-	0.000	1.841	-
Subtotal			-	14.454		14.346		23.048		-		23.048	0.000	51.848	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
HEGM - Project Manager Office	PO	Office of the Project Manager (PM) Combat Ammunition	-	0.575	Jun 2017	0.975	Dec 2017	-		-		-	0.000	1.550	-

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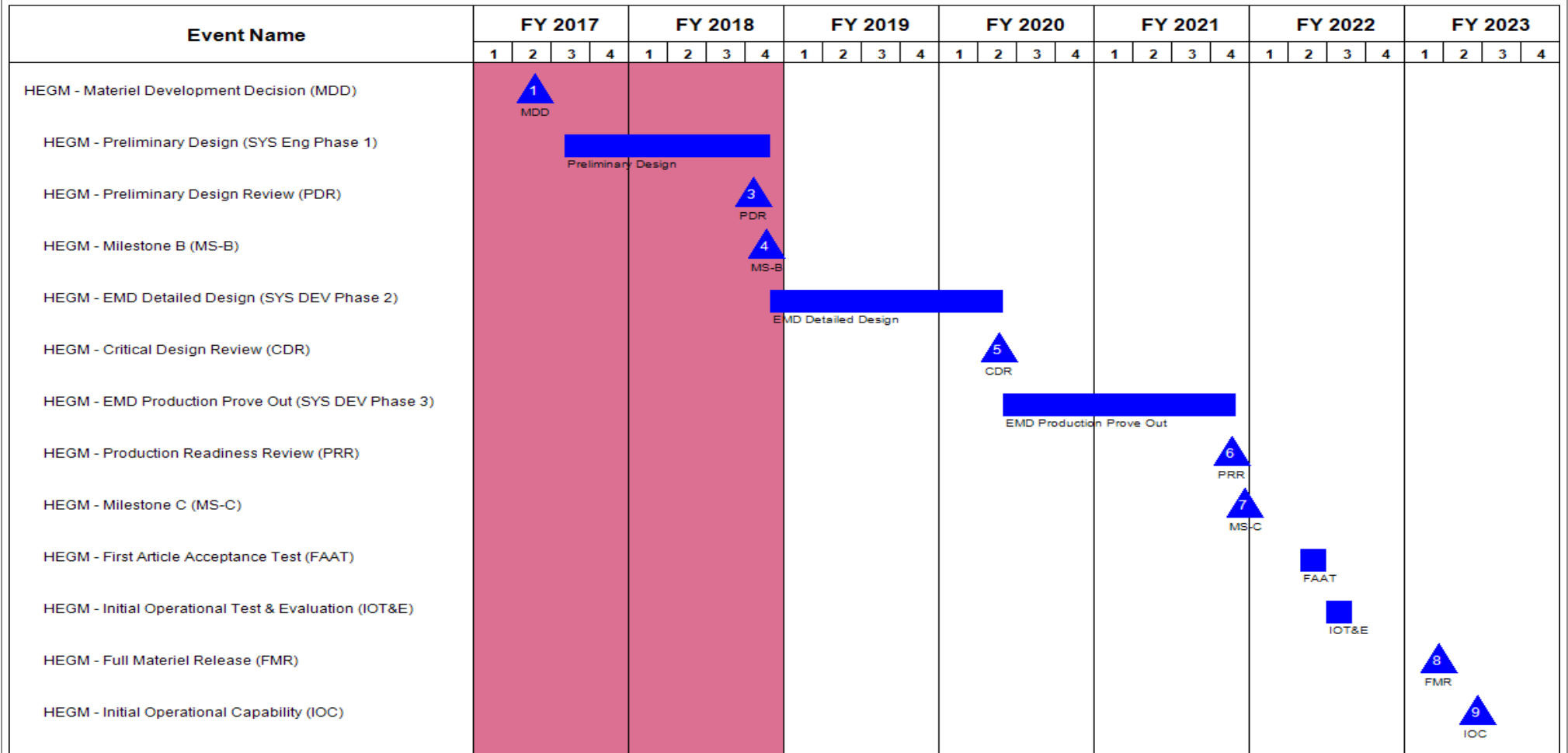
Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development						Project (Number/Name) 613 / MORTAR SYSTEMS			
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
		Systems (CAS) : Picatinny Arsenal, NJ													
HEGM - ARDEC Engineering Support	MIPR	Armament Reasech, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	1.440	Jun 2017	2.100	Dec 2017	2.558	Dec 2018	-		2.558	0.000	6.098	-
WULF - Project Manager Office	PO	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.080	Jun 2017	0.180	Dec 2017	-		-		-	0.000	0.260	-
WULF - ARDEC Engineering Support	MIPR	Armament Reasech, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.743	Jun 2017	0.617	Dec 2017	-		-		-	0.000	1.360	-
Subtotal			-	2.838		3.872		2.558		-		2.558	0.000	9.268	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
HEGM - Developmental Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	0.350	Sep 2017	1.100	Sep 2018	2.500	Sep 2019	-		2.500	0.000	3.950	-
WULF - Environmental Testing	MIPR	TBD : TBD	-	-		0.527	Sep 2018	-		-		-	0.000	0.527	-
WULF - System Level Developmental Testing	MIPR	TBD : TBD	-	-		0.270	Sep 2018	-		-		-	0.000	0.270	-
Subtotal			-	0.350		1.897		2.500		-		2.500	0.000	4.747	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army										Date: February 2018							
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development					Project (Number/Name) 613 / MORTAR SYSTEMS							
					Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals					-	17.642		20.115		28.106		-		28.106	0.000	65.863	N/A
Remarks																	

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) 613 / MORTAR SYSTEMS	



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army																Date: February 2018																
Appropriation/Budget Activity 2040 / 5										R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development								Project (Number/Name) 613 / MORTAR SYSTEMS														
Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
HEGM - Full Rate Production (FRP)																													10 FRP			
WULF - Acquisition Decision Memorandum (ADM)					2 ADM																											
WULF - Engineering & Manufacturing Development					EMD																											
WULF - EMD Software Development (EMD SW)					EMD Software Development																											
WULF - EMD Hardware Development (EMD HW)					EMD Hardware Development																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) 613 / <i>MORTAR SYSTEMS</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
HEGM - Materiel Development Decision (MDD)	2	2017	2	2017
HEGM - Preliminary Design (SYS Eng Phase 1)	3	2017	4	2018
HEGM - Preliminary Design Review (PDR)	4	2018	4	2018
HEGM - Milestone B (MS-B)	4	2018	4	2018
HEGM - EMD Detailed Design (SYS DEV Phase 2)	4	2018	2	2020
HEGM - Critical Design Review (CDR)	2	2020	2	2020
HEGM - EMD Production Prove Out (SYS DEV Phase 3)	2	2020	4	2021
HEGM - Production Readiness Review (PRR)	4	2021	4	2021
HEGM - Milestone C (MS-C)	4	2021	4	2021
HEGM - First Article Acceptance Test (FAAT)	2	2022	2	2022
HEGM - Initial Operational Test & Evaluation (IOT&E)	3	2022	3	2022
HEGM - Full Materiel Release (FMR)	1	2023	1	2023
HEGM - Initial Operational Capability (IOC)	2	2023	2	2023
HEGM - Full Rate Production (FRP)	3	2023	3	2023
WULF - Acquisition Decision Memorandum (ADM)	3	2017	3	2017
WULF - Enginerring & Manufacturing Development	4	2017	4	2018
WULF - EMD Software Development (EMD SW)	4	2017	4	2018
WULF - EMD Hardware Development (EMD HW)	1	2018	4	2018

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EC4 / Non-Standard Simulator Munitions			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EC4: Non-Standard Simulator Munitions	-	0.000	2.839	3.150	-	3.150	2.644	2.121	2.159	0.000	0.000	12.913
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project will standardize various pyrotechnic 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, 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) on a wire to replicate the flight of a Rocket Propelled Grenade; High Order Blast Effect (HOBE) used to replicate a Vehicle Borne Improvised Explosive Device (VBIED), building explosions, and other significant explosive events; Artillery airburst (LA45) simulator to replicate indirect fire; simulator to replicate a STINGER (LA47) firing; Tracer Fire-back simulator to replicate enemy small arms fire and anti-aircraft fire. Standardization will reduce training costs, eliminate redundancies between systems, mitigate environmental concerns and safety risks associated with realistic scenario based training.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Standardize Special Use Ammunition	-	2.839	3.150	-	3.150
Description: Standardize non-standard pyrotechnic battlefield effects currently used by CTCs .					
FY 2018 Plans: This project will support the Engineering Manufacturing and Development (EMD) phase for Force on Force Black Smoke signature (burning vehicles, buildings, and equipment), Artillery airburst simulator and Tracer/STINGER simulators. Material Release (MR) the LA45 and LA47; TC and Full Material Release (FMR) for Black Smoke Force on Target (FOT) cartridge. Test & Evaluate (T&E) and commence TC activities for FOT yellow smoke and Force on Force (FOF) black smoke, T&E Rocket Propelled Grenade (RPG) on a wire and Vehicle Borne Improvised Explosive Device (VBIED).					
FY 2019 Base Plans: This project will support the Engineering Manufacturing and Development (EMD) phase for Force on Force Black Smoke signature (burning vehicles, buildings, and equipment). Material Release (MR) the LA45 and LA47; TC					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army				Date: February 2018	
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>		Project (Number/Name) EC4 / <i>Non-Standard Simulator Munitions</i>	

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
and Full Material Release (FMR) for Black Smoke Force on Target (FOT) cartridge. T&E and commence TC activities for FOT yellow smoke and Force on Force (FOF) black smoke, T&E RPG on a wire and VBIED.					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> FY19 funding increased by \$311k for additional product development efforts.					
Accomplishments/Planned Programs Subtotals	-	2.839	3.150	-	3.150

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• E88404: <i>Simulators, Non-Standard, Special Effects for CTCs; SSN E88404</i>	0.979	1.632	1.663	-	1.663	1.699	1.750	0.283	-	0.000	8.006

Remarks

D. Acquisition Strategy
The Acquisition strategy is for a family of special use ammunition that will be developed in incremental phases as funding and requirements are approved. Milestone Decision Document (MDD) Approval 4th Qtr FY2018. Initial special use ammunition will be black and yellow smoke munitions followed by new increments that will defeat threats outlined in the requirements documents developed by US Army Training and Doctrine Command (TRADOC).

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development						Project (Number/Name) EC4 / Non-Standard Simulator Munitions			
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Management	MIPR	PM Close Combat Systems : PICATINNY ARSENAL	0.289	-		0.095	Feb 2018	0.061	Feb 2019	-		0.061	0.000	0.445	-
Subtotal			0.289	-		0.095		0.061		-		0.061	0.000	0.445	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	C/FFP	ARDEC : PICATINNY ARSENAL	1.134	-		1.164	Jul 2018	1.489	May 2019	-		1.489	0.000	3.787	-
Subtotal			1.134	-		1.164		1.489		-		1.489	0.000	3.787	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	ARDEC : Picatinny Arsenal	0.802	-		0.580	Feb 2018	0.600	Feb 2019	-		0.600	0.000	1.982	-
Subtotal			0.802	-		0.580		0.600		-		0.600	0.000	1.982	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	ARDEC : Picatinny	0.541	-		1.000	Aug 2018	1.000	Jun 2019	-		1.000	0.000	2.541	-
Subtotal			0.541	-		1.000		1.000		-		1.000	0.000	2.541	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018				
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development					Project (Number/Name) EC4 / Non-Standard Simulator Munitions					
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			2.766	-		2.839		3.150		-		3.150	0.000	8.755	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>		Project (Number/Name) EC4 / <i>Non-Standard Simulator Munitions</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Materiel Development Decision Special Use Ammunition Pyrotechnic																												
Review/qualify Marine Corps test data for LA45/LA47																												
MS B Force on Target Simulator																												
Conduct T&E, TC/MR black smoke cartridge																												
Evaluate Marine Corps TC/MR																												
Force on Force Black Smoke Development																												
MS B Force on Force Simulator																												
Conduct T&E, TC/MR Force on Force Yellow Smoke																												
MS C Force on Target Simulator																												
MS C Force on Force Simulator																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EC4 / <i>Non-Standard Simulator Munitions</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Materiel Development Decision Special Use Ammunition Pyrotechnics	2	2017	2	2018
Review/qualify Marine Corps test data for LA45/LA47	2	2018	3	2018
MS B Force on Target Simulator	4	2018	4	2018
Conduct T&E, TC/MR black smoke cartridge	4	2018	1	2019
Evaluate Marine Corps TC/MR	2	2019	3	2019
Force on Force Black Smoke Development	1	2019	2	2020
MS B Force on Force Simulator	2	2019	2	2019
Conduct T&E, TC/MR Force on Force Yellow Smoke	3	2019	4	2019
MS C Force on Target Simulator	3	2020	3	2020
MS C Force on Force Simulator	1	2021	1	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
ED7: Advanced Multipurpose (AMP) Cartridge	-	30.014	31.655	27.720	-	27.720	0.000	0.000	0.000	0.000	0.000	89.389
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Multi Purpose (AMP) program is 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 Anti Tank Guided Missile (ATGM) teams from 50m to 2000m (T) and 50m to 4500m (O), 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. FY 2019 will support the continuation of Engineering and Manufacturing Development (EMD) Phase 2 and transition into Low Rate Initial Production (LRIP). This includes the completion of the Developmental Test and Evaluation (DT&E) cartridge build, initiation and completion of DT&E, and Milestone C. Continue to evaluate the scalability for future combat platforms. Conduct fuze risk reduction effort with potential second source supplier. Demonstrate feasibility of a training round for AMP.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Engineering and Manufacturing Development (EMD) Phase 1	2.039	-	-	-	-
Description: Develop, demonstrate and qualify the AMP 120mm large caliber munition.					
Title: Downselect / Engineering and Manufacturing Development (EMD) Phase 2	27.975	-	-	-	-
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.					
Title: Engineering and Manufacturing Development (EMD) Phase 2	-	31.155	19.152	-	19.152
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 2018 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018			
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Engineering Manufacturing Development Phase 2 is continuing and the execution of safety and performance tests which optimize the subsystems for performance is occurring. Cartridges are being manufactured and procured for the third Cartridge Integration Test. In addition, the Critical Design Review (CDR) is being conducted and the initiation of the Developmental Test and Evaluation (DT&E) cartridge build is taking place. FY 2019 Base Plans: Engineering Manufacturing Development Phase 2 will continue with the completion of the Developmental Test & Evaluation (DT&E) build, initiation and completion of DT&E which will include 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 2018 to FY 2019 Increase/Decrease Statement: Engineering and Manufacturing Development (EMD) Phase 2 work continues into FY 2019						
Title: Evaluation for Future Combat Platforms Description: Evaluation of the scalability for future combat platforms. FY 2018 Plans: Evaluation of the scalability for future combat platforms. FY 2019 Base Plans: Efforts will continue on the evaluation of the scalability for future combat platforms FY 2018 to FY 2019 Increase/Decrease Statement: Evaluation of the scalability for future combat platforms effort continues into FY 2019		-	0.500	0.573	-	0.573
Title: Fuze Risk Reduction Description: Conduct fuze risk reduction effort with potential second source supplier FY 2019 Base Plans: Fuze risk reduction effort with potential second source supplier will be conducted FY 2018 to FY 2019 Increase/Decrease Statement: Fuze risk reduction effort with potential second source supplier will be conducted		-	-	5.891	-	5.891
Title: Training Round Demonstration		-	-	2.104	-	2.104

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army				Date: February 2018	
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge	
B. Accomplishments/Planned Programs (\$ in Millions)				FY 2017	FY 2018
Description: Demonstrate feasibility of a training round for AMP					
FY 2019 Base Plans: Feasibility of a training round for AMP will be demonstrated.					
FY 2018 to FY 2019 Increase/Decrease Statement: Feasibility of a training round for AMP will be demonstrated.					
Accomplishments/Planned Programs Subtotals				30.014	31.655
				27.720	-
				27.720	
C. Other Program Funding Summary (\$ in Millions)					
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
• E88105: CTG, 120MM TANK, HEMP-T, XM1147	-	-	24.598	-	24.598
					29.548
					39.485
					47.408
					47.426
					0.000
					188.465
Remarks					
D. Acquisition Strategy					
The 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 downselect to a single contractor for EMD Phase 2, which will lead to Milestone C in 2019 followed by two Low Rate Initial Productions in FY 2019 and FY 2020 and one optional year of full procurement in FY 2021. Explore options to increase future competition.					
E. Performance Metrics					
N/A					

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) Labor and travel	Various	Picatinny : NJ	1.747	1.750		1.260		1.121		-		1.121	Continuing	Continuing	Continuing
Orbital Alliant Techsystems Operations (OATK)	C/CPIF	OATK : Plymouth, MN	32.450	22.354		23.741		4.702		-		4.702	Continuing	Continuing	Continuing
General Dynamics Ordnance and Tactical Systems (GDOTS)	C/TBD	GDOTS : St Petersburg, FL	-	-		-		5.657		-		5.657	Continuing	Continuing	Continuing
Subtotal			34.197	24.104		25.001		11.480		-		11.480	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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, Development and Engineering Center (ARDEC)	MIPR	Picatinny : NJ	4.411	1.950		2.350		3.125		-		3.125	Continuing	Continuing	Continuing
Subtotal			4.411	1.950		2.350		3.125		-		3.125	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Yuma Test Center	MIPR	Yuma Proving Ground : AZ	1.500	2.423		2.295		9.931		-		9.931	Continuing	Continuing	Continuing
Aberdeen Test Center	MIPR	Aberdeen Proving Ground : MD	2.219	1.537		2.009		3.184		-		3.184	Continuing	Continuing	Continuing
Subtotal			3.719	3.960		4.304		13.115		-		13.115	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development					Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge			
	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	42.327	30.014		31.655		27.720		-		27.720	Continuing	Continuing	N/A

Remarks

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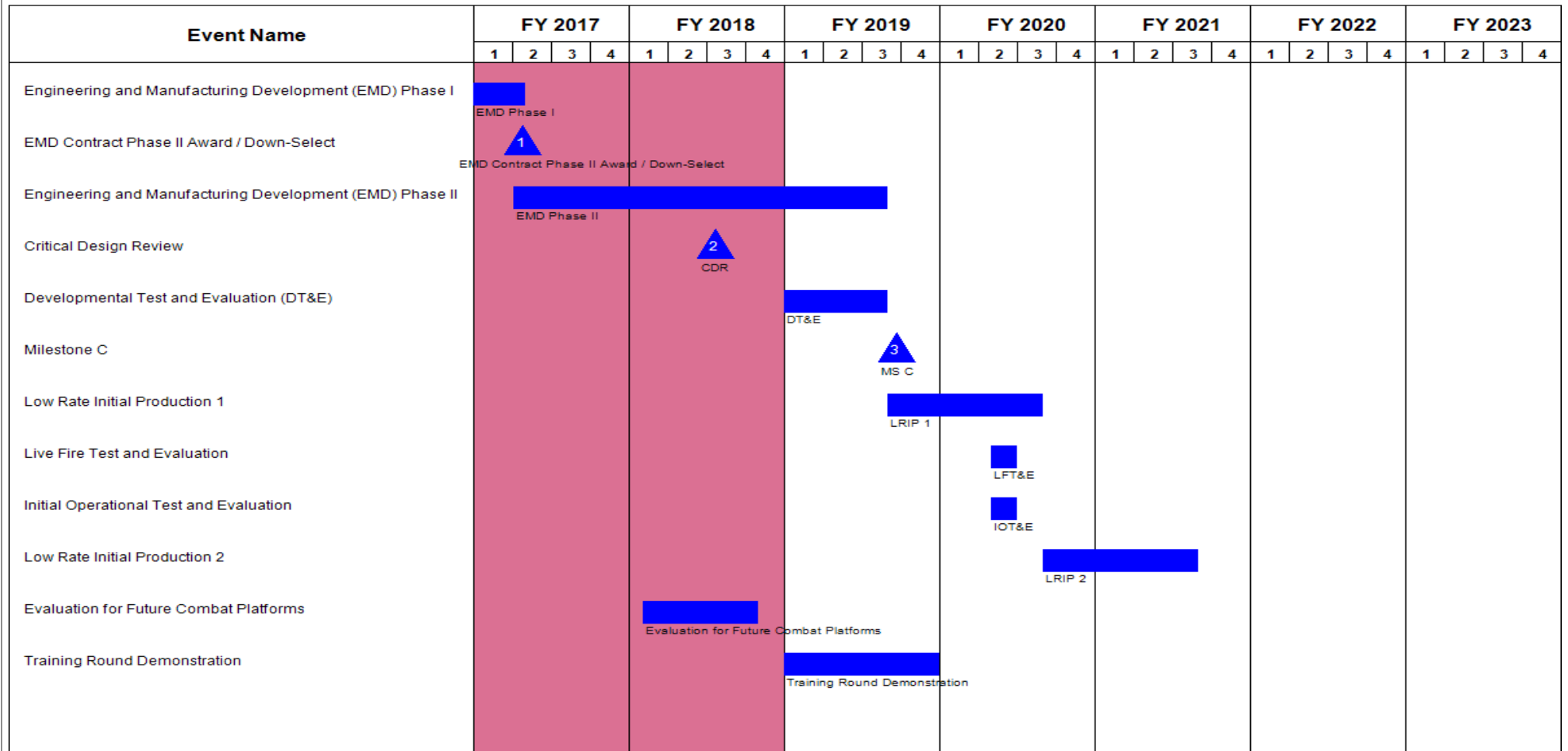
Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity
2040 / 5

R-1 Program Element (Number/Name)
PE 0604802A / Weapons and Munitions
Engineering Development

Project (Number/Name)
ED7 / Advanced Multipurpose (AMP)
Cartridge



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) ED7 / <i>Advanced Multipurpose (AMP) Cartridge</i>	

Schedule Details

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

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EL9 / Ammunitions Logistics Prototyping			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EL9: Ammunitions Logistics Prototyping	-	0.102	0.686	2.016	-	2.016	2.302	1.683	0.697	0.988	0.000	8.474
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note In FY 2019 Program Element (PE) 0604802A, Project EL9, Ammunition Logistics Prototyping will transition to E80100 Project 155mm Extended Range M982.												
A. Mission Description and Budget Item Justification This 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. FY19 funding will be used to integrate the munitions health monitoring system and continue to integrate passive time/temperature exposure sensors with additional developmental ammunition items and conduct qualification tests for both.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Munitions Survivability and Logistics Enablers								0.102	0.686	2.016	-	2.016
Description: This program will develop ammunition logistics systems that improve munitions survivability and logistics												
FY 2018 Plans: Integrate the munitions health monitoring system with developmental ammunition items and conduct qualification tests. Integrate passive time/temperature exposure sensor with developmental ammunition items and conduct qualification testing.												
FY 2019 Base Plans: Integrate the munitions health monitoring system with additional developmental ammunition items and conduct qualification tests. Continue to integrate passive time/temperature exposure sensor with developmental ammunition items and conduct qualification testing.												
FY 2018 to FY 2019 Increase/Decrease Statement:												

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>		Project (Number/Name) EL9 / <i>Ammunitions Logistics Prototyping</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO
Funding in FY 2019 is increased due to the need for integration and qualification testing of additional developmental ammunition items.					
Accomplishments/Planned Programs Subtotals		0.102	0.686	2.016	-
C. Other Program Funding Summary (\$ in Millions) N/A					
Remarks In FY 2019 Program Element (PE) 0604802A, Project EL9, Ammunition Logistics Prototyping will transition to E80100 Project 155mm Extended Range M982					
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 at Milestone B into families of end items.					
E. Performance Metrics N/A					

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army													Date: February 2018		
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EL9 / Ammunitions Logistics Prototyping					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Contractor	C/TBD	TBD : TBD	-	-		0.300		0.750		-		0.750	0.000	1.050	-
Subtotal			-	-		0.300		0.750		-		0.750	0.000	1.050	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
ARDEC	MIPR	Picatinny Arsenal : NJ	-	0.102		0.186		0.616	Dec 2018	-		0.616	0.000	0.904	-
Subtotal			-	0.102		0.186		0.616		-		0.616	0.000	0.904	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Operational Testing - RRAPDS	RO	Yuma Proving Ground : Yuma Arizona	-	-		0.200		0.650	Mar 2019	-		0.650	0.000	0.850	-
Subtotal			-	-		0.200		0.650		-		0.650	0.000	0.850	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	0.102		0.686		2.016		-		2.016	0.000	2.804	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity

2040 / 5

[illegible]PE 0604802A / Weapons and Munitions
Engineering Development

Project (Number/Name)	Start Date	End Date	Status	Manager	Budget (USD)	Actual Cost (USD)	Progress (%)	Risk Level	Notes
101	2023-01-15	2023-03-31	Completed	John Doe	15000	14800	100	Low	Project completed ahead of schedule.
102	2023-02-01	2023-04-30	In Progress	Jane Smith	22000	18500	85	Medium	Minor delays in procurement.
103	2023-03-01	2023-05-31	On Hold	Mike Johnson	18000	0	0	High	Waiting for client requirements.
104	2023-04-01	2023-06-30	Planned	Sarah Lee	25000	0	0	Medium	Initial planning phase.
105	2023-05-01	2023-07-31	On Hold	David Kim	20000	0	0	Low	Resource allocation pending.
106	2023-06-01	2023-08-31	Planned	Emily White	12000	0	0	Medium	Scope definition in progress.
107	2023-07-01	2023-09-30	On Hold	Chris Brown	16000	0	0	High	Technical challenges identified.
108	2023-08-01	2023-10-31	Planned	Alex Green	28000	0	0	Medium	Market research ongoing.
109	2023-09-01	2023-11-30	On Hold	Mia Black	14000	0	0	Low	Waiting for budget approval.
110	2023-10-01	2023-12-31	Planned	Noah Grey	19000	0	0	Medium	Vendor selection process.

EL9 / Ammunitions Logistics Prototyping

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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																												
System Development - Low Cost Thermal Indicator																												
System Development - Next Generation Temperature/Humidity Sensor																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EL9 / <i>Ammunitions Logistics Prototyping</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
System Development - Munitions Health Monitoring System	2	2018	4	2023
System Development - Low Cost Thermal Indicator	3	2017	2	2023
System Development - Next Generation Temperature/Humidity Sensor	2	2019	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EP3: Reduced Range Ammunition - Small Caliber	-	0.000	0.000	2.473	-	2.473	8.280	14.826	10.129	8.003	0.000	43.711
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The effort under Program Element (PE) 0603639A, Project EL7, Reduced Range Ammunition (RRA), will transition in FY 2019 to PE 0604802A, Project EP3, Reduced Range Ammunition - Small Caliber. PE 0604802A, Project EP3, RRA funding continues the development work of 7.62mm and supports Engineering and Manufacturing Development (EMD) in FY 2019. The project is not a new start.

A. Mission Description and Budget Item Justification

The small caliber Reduced Range Ammunition (RRA) Project is a critical technology development in response to the 7.62mm 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. FY 2019 funding will support Milestone (MS) B activities to include Request for Proposal (RFP), Preliminary Design Review (PDR) and Engineering and Manufacturing Development (EMD) Contract Award for the 7.62mm caliber variant. Funding will also explore lessons learned from the Marine Corp .50 Caliber Reduced Range Ammunition effort and other various options to satisfy the .50 Caliber reduced range requirement.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Engineering and Manufacturing Development	-	-	2.473	-	2.473
Description: Engineering and Manufacturing Development (EMD) Contract for 7.62mm Reduced Range Ammunition.					
FY 2019 Base Plans: FY 2019 activities will include various Milestone B activities for 7.62mm to include Industry Day, release Request for Proposal (RFP), perform a System Functional Review, conduct bid sample testing in support of contract award for Engineering and Manufacturing Development (EMD), and conduct a Preliminary Design Review (PDR).					
FY 2018 to FY 2019 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army				Date: February 2018	
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber	

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
The 7.62mm RRA project transitions from Program Element (PE) 0603639A, Project EL7, in FY 2019 to PE 0604802A, Project EP3					
Accomplishments/Planned Programs Subtotals	-	-	2.473	-	2.473

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• EL7: Reduced Range Ammunition	1.314	7.600	7.618	-	7.618	-	-	-	-	0.000	16.532
Remarks Program Element 0604802A, Project EP3, Reduced Range Ammunition transitioned from PE 0603639A, Project EL7, RRA in FY 2019. EL7 Reduced Range Ammunition is not a new start in FY 2019.											
D. Acquisition Strategy After 7.62mm Milestone (MS) B in FY 2019, the Government intends to award an Engineering and Manufacturing Development (EMD) contract. The Government will then award a competitive contract for 7.62mm Pre-Production Qualification Testing (PPQT) hardware in FY 2020. The .50 Caliber effort follows a similar strategy starting in FY 2018. After .50 Caliber Reduced Range Ammunition (RRA) MS B in FY 2020, the Government intends to award a competitive EMD contract.											
E. Performance Metrics N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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)	MIPR	Picatinny Arsenal : New Jersey	-	-		-		0.173		-		0.173	Continuing	Continuing	Continuing
Development Contract	C/FFP	TBD : TBD	-	-		-		1.100		-		1.100	Continuing	Continuing	Continuing
Subtotal			-	-		-		1.273		-		1.273	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	-	-		-		0.900		-		0.900	0.000	0.900	-
Subtotal			-	-		-		0.900		-		0.900	0.000	0.900	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Tests	MIPR	Aberdeen Test Center : Aberdeen, Maryland	-	-		-		0.300		-		0.300	Continuing	Continuing	Continuing
Subtotal			-	-		-		0.300		-		0.300	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		0.000		2.473		-		2.473	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity

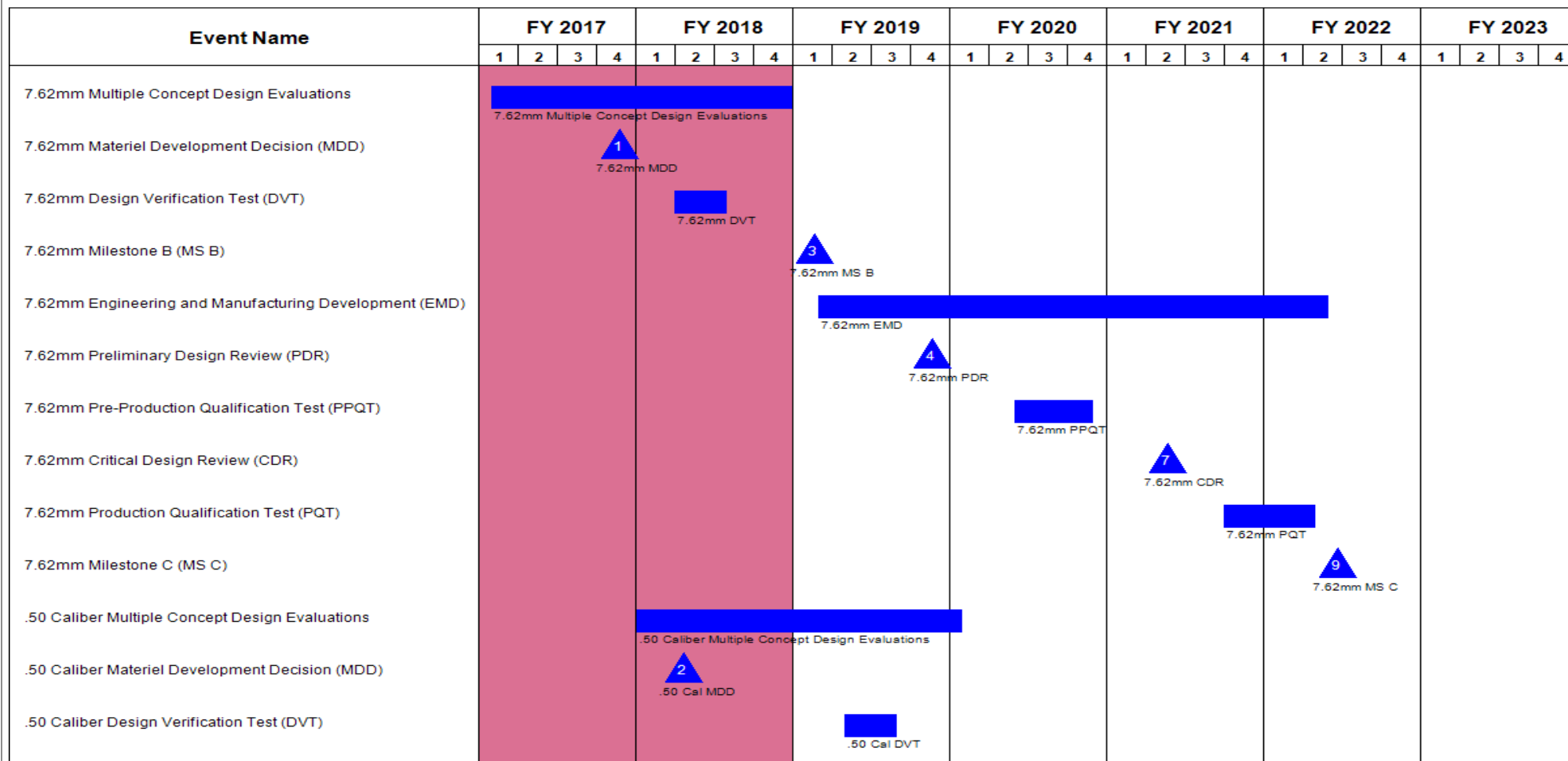
2040 / 5

R-1 Program Element (Number/Name)

PE 0604802A / Weapons and Munitions
Engineering Development

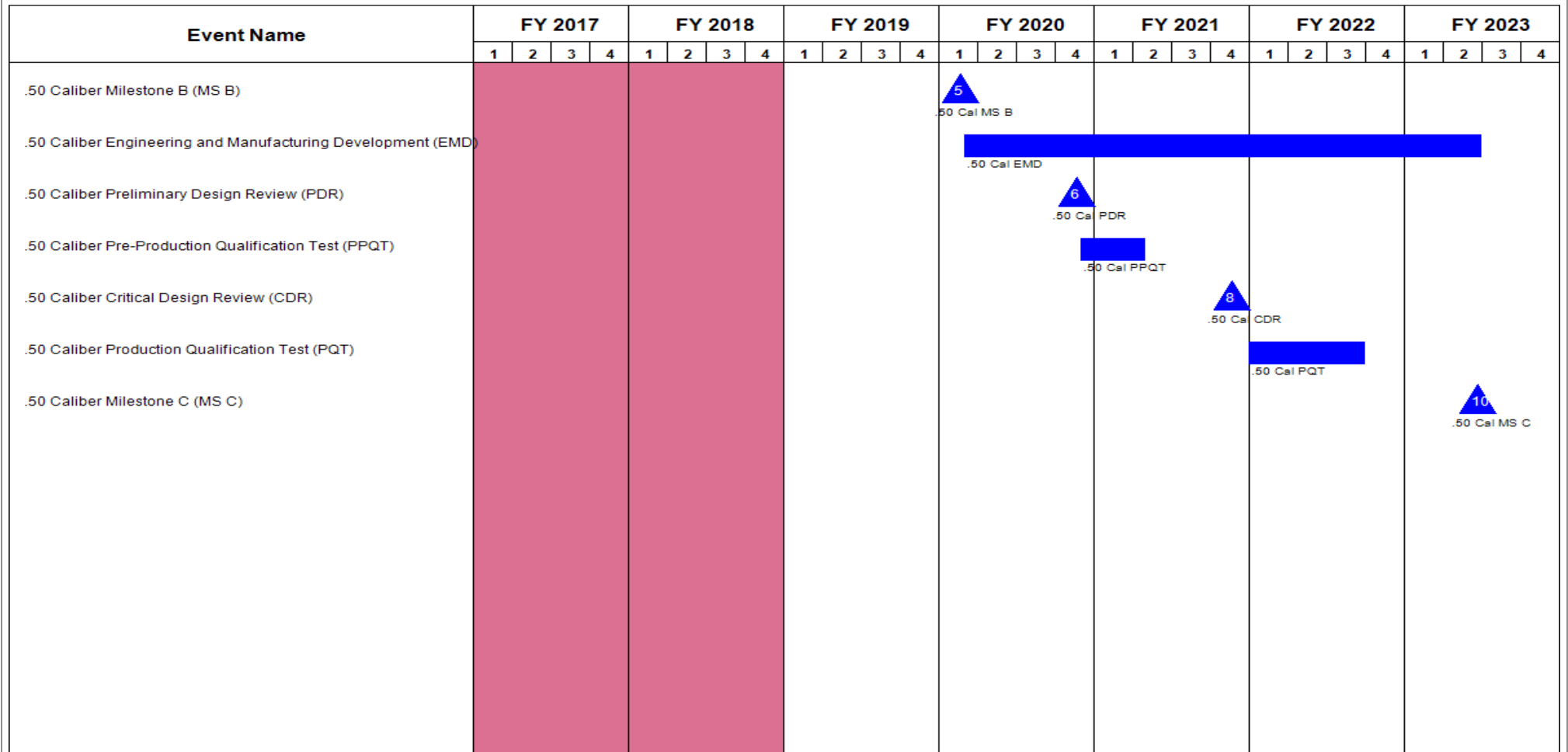
Project (Number/Name)

EP3 / Reduced Range Ammunition - Small
Caliber



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber	



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</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 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	4	2020
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 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 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 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 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EP4: One-Way Luminescence for Small Caliber Ammo	-	0.000	2.688	6.085	-	6.085	6.472	12.247	5.324	6.422	0.000	39.238
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber One Way Luminescence (OWL) technology applies to multiple calibers. In FY 2018, the 7.62mm variant transitions from Program Element (PE) 0603639A, Project EB8, OWL for Small Caliber Ammunition to PE 0604802A, Project EP4, One-Way Luminescence for Small Caliber Ammo; the project is not a new start. OWL develops a new tracer technology and applies it to multiple calibers. The initial focus was on 7.62mm ammunition in FY 2015 followed by 5.56mm in FY 2018. As the technology matures the project transitions to PE 0604802A, Project EP4 starting in FY 2018 for 7.62mm OWL, and FY 2021 for 5.56mm OWL. 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.

A. Mission Description and Budget Item Justification

The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62mm 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. OWL projects objective is to develop and field a full day/night 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. 7.62mm is the immediate focus followed by 5.56mm OWL cartridges and later followed by .50 Caliber cartridges. FY 2019 funding will support post Milestone B (MS B) activities to include Engineering and Manufacturing Development (EMD), Design Verification Testing (DVT), Preliminary Design Review (PDR), and a User Assessment (UA) for the 7.62mm caliber ammunition.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Technology Maturation and Risk Reduction (TMRR)	-	2.688	-	-	-
Description: One Way Luminescence (OWL) will develop and demonstrate a full day/night tracer technology that eliminates the shortcomings of current legacy tracers.					
FY 2018 Plans: FY 2018 efforts will include preparation for MS B achievement, contract award for 7.62mm EMD Phase, and Design Verification Tests (DVT).					
FY 2018 to FY 2019 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army							Date: February 2018				
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>			Project (Number/Name) EP4 / <i>One-Way Luminescence for Small Caliber Ammo</i>				

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
EMD down-select contract planned for in FY 2019.					
Title: Engineering and Manufacturing Development (EMD)	-	-	6.085	-	6.085
FY 2019 Base Plans: FY 2019 activities will support the continuation of EMD and early manufacturing efforts with the 7.62mm OWL design. 7.62mm designs will undergo Verification Testing, Preliminary Design Review (PDR), and a User Assessment (UA).					
FY 2018 to FY 2019 Increase/Decrease Statement: EMD down-select contract planned for in FY 2019.					
Accomplishments/Planned Programs Subtotals	-	2.688	6.085	-	6.085

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• EB8: OWL for Small Caliber Ammunition	-	1.200	2.200	-	2.200	2.000	-	-	-	Continuing	Continuing

Remarks

One Way Luminescence (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. As the technology matures it will be transitioned from Program Element 0603639A, Project EB8 to Program Element 0604802A, Project EP4 in FY 2018 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. A Technology Readiness Assessment (TRA) was conducted in FY 2015 and FY 2016 to measure the progress of the designs. The FY 2017 TRA was conducted to evaluate the industry and Government concepts in order to proceed with the 7.62mm Engineering and Manufacturing Development (EMD). The 5.56mm and .50 Caliber cartridges will follow the 7.62mm schedule with Engineering and Manufacturing Development (EMD) starting in FY 2021. The new tracer cartridges will replace legacy tracers in each of the various small caliber configurations.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) - Labor & Travel	Various	Picatinny Arsenal : New Jersey	-	-		0.274		0.085		-		0.085	Continuing	Continuing	Continuing
EMD Contractor To Be Determined	TBD	To Be Determined : To Be Determined	-	-		1.422		2.600		-		2.600	Continuing	Continuing	Continuing
Subtotal			-	-		1.696		2.685		-		2.685	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	-	-		0.892		2.200		-		2.200	Continuing	Continuing	Continuing
Subtotal			-	-		0.892		2.200		-		2.200	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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)	MIPR	Aberdeen Proving Ground : Maryland	-	-		0.100		0.850		-		0.850	Continuing	Continuing	Continuing
Independent Testing	TBD	TBD : TBD	-	-		-		0.150		-		0.150	Continuing	Continuing	Continuing
User Evaluation	TBD	TBD : TBD	-	-		-		0.200		-		0.200	Continuing	Continuing	Continuing
Subtotal			-	-		0.100		1.200		-		1.200	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		2.688		6.085		-		6.085	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018			
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development			Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo				
	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	
Remarks										

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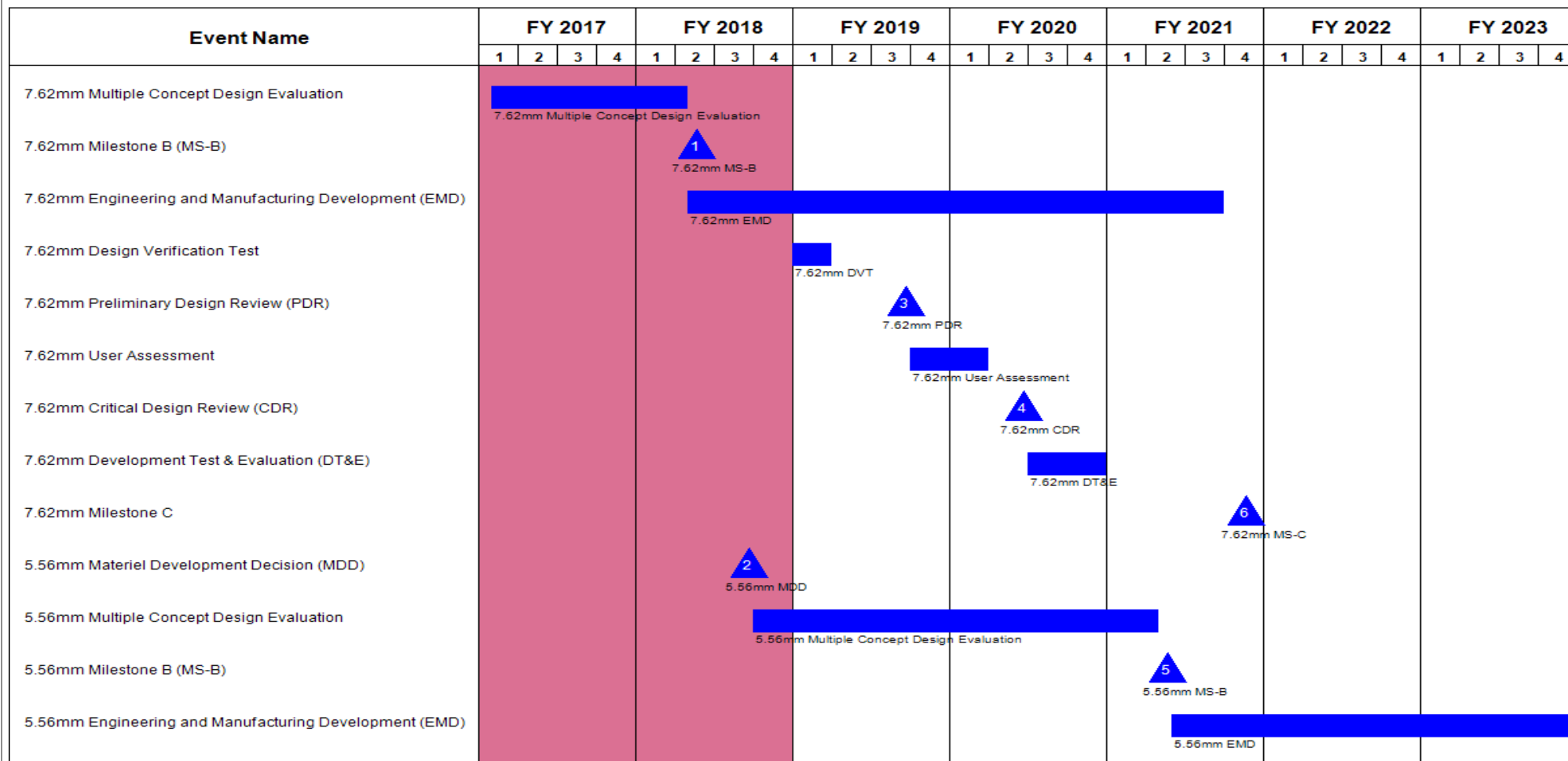
Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018








Appropriation/Budget Activity
2040 / 5

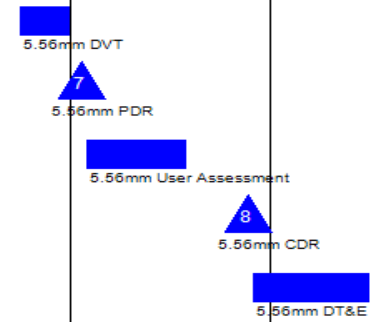
R-1 Program Element (Number/Name)
PE 0604802A / Weapons and Munitions
Engineering Development

Project (Number/Name)
EP4 / One-Way Luminescence for Small
Caliber Ammo



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army																Date: February 2018												
Appropriation/Budget Activity 2040 / 5										R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development								Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo										
Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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 Design Verification Test																												
5.56mm DVT																												
																												
5.56mm PDR																												
																												
5.56mm Preliminary Design Review (PDR)																												
5.56mm User Assessment																												
																												
5.56mm CDR																												
																												
5.56mm User Assessment																												
5.56mm DT&E																												
5.56mm Development Test & Evaluation (DT&E)																												
5.56mm Critical Design Review (CDR)																												
5.56mm Design Verification Test																												



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</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 Multiple Concept Design Evaluation	1	2015	2	2018
7.62mm Milestone B (MS-B)	2	2018	2	2018
7.62mm Engineering and Manufacturing Development (EMD)	2	2018	3	2021
7.62mm Design Verification Test	1	2019	1	2019
7.62mm Preliminary Design Review (PDR)	3	2019	3	2019
7.62mm User Assessment	4	2019	1	2020
7.62mm Critical Design Review (CDR)	2	2020	2	2020
7.62mm Development Test & Evaluation (DT&E)	3	2020	4	2020
7.62mm Milestone C	4	2021	4	2021
5.56mm Materiel Development Decision (MDD)	3	2018	3	2018
5.56mm Multiple Concept Design Evaluation	4	2018	2	2021
5.56mm Milestone B (MS-B)	2	2021	2	2021
5.56mm Engineering and Manufacturing Development (EMD)	2	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	2	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	-	12.452	11.571	21.019	-	21.019	4.783	13.953	6.918	6.446	0.000	77.142
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber Advanced Armor-Piercing (ADVAP) technology applies to multiple calibers. In FY 2017, Program Element (PE) 0603639A, Project EC2, Adv Armor-Piercing (ADVAP) for Small Cal Ammo transitioned to PE 0604802A, Project EP5, Adv Armor-Piercing (ADVAP) for Small Cal Ammo for development of the 7.62mm ammunition. The follow-on effort for ADVAP ammunition calibers below 7.62mm begins in FY 2019. Project EC2 is not a new start in FY 2019. In FY 2021, Program Element (PE) 0603639A, Project EC2, ADVAP will transition to PE 0604802A, Project EP5, ADVAP to continue development efforts on ADVAP ammunition calibers below 7.62mm.

A. Mission Description and Budget Item Justification

Advanced Armor-Piercing (ADVAP): The ADVAP project is a critical technology development in response to the 7.62mm 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 objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. FY 2019 funding supports continuation of Engineering and Manufacturing Development (EMD) efforts and activities to accelerate the project.

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 Full Materiel Release (FMR) the new ammunition. FY 2019 funding supports Engineering and Manufacturing Development (EMD) efforts and activities to accelerate the project for the Enhanced Performance Round (EPR) variant and the Advanced Armor-Piercing (ADVAP) variant. Follow-on development efforts for additional NGSW ammunition variants including tracer ammunition, blank ammunition, and reduced range ammunition will start in FY 2022.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: 7.62mm Engineering & Manufacturing Development (EMD)	12.452	11.571	12.750	-	12.750
Description: Develop, demonstrate, and qualify XM1158 Small Caliber Ammunition 7.62mm Advanced Armor Piercing (ADVAP) cartridges in order to defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.					
FY 2018 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army								Date: February 2018				
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo				
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
FY 2018 efforts are focused on Engineering and Manufacturing Development (EMD) to include maturing manufacturing as well as optimization of the cartridge designs, and Pre-Production Qualification Test (PPQT) to support Critical Design Review (CDR) and Production Qualification Test (PQT) in FY 2019. FY 2019 Base Plans: FY 2019 efforts will focus on continuing the support of Engineering and Manufacturing Development (EMD) activities such as Developmental Testing and Evaluation (DT&E). FY 2019 also includes an Urgent Materiel Release (UMR) to accelerate the fielding of the 7.62mm ADVAP cartridge and preparation for an accelerated Milestone C accomplishment at the end of FY 2019. FY 2018 to FY 2019 Increase/Decrease Statement: Program increase in FY 2019 to continue planned FY 2019 EMD activities.												
Title: NGSW Ammo Engineering & Manufacturing Development (EMD) Description: Develop, demonstrate, and qualify new ammunition for the Next Generation Squad Weapon (NGSW) systems. FY 2019 Base Plans: Milestone B will occur in FY 2019 and Engineering and Manufacturing Development (EMD) activities will commence for the Enhanced Performance Round (EPR) and the Advanced Armor Piercing (ADVAP) variants. Concept evaluation will be conducted, leading to Developmental Testing (DT) in preparation for Preliminary Design Review in FY 2020. FY 2018 to FY 2019 Increase/Decrease Statement: Program increase in FY 2019 to start planned FY 2019 EMD activities for the new ammunition for the Next Generation Squad Weapon (NGSW) systems.								-	-	8.269	-	8.269
Accomplishments/Planned Programs Subtotals								12.452	11.571	21.019	-	21.019
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost	
• EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	-	3.760	-	3.760	6.821	-	-	-	0.000	10.581	
• F57510: CTG, 7.62mm Advanced Armor Piercing, XM1158	-	-	25.000	-	25.000	21.013	22.984	25.682	25.692	0.000	120.371	

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army									Date: February 2018		
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo			
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Remarks											
EC2-RDTE/Adv Armor-Piercing (ADVAP) for Small Cal Ammo: This funding line continues the development, technology maturation, and Pre-Engineering & Manufacturing Development (Pre-EMD) work on ADVAP cartridges in calibers below 7.62mm.											
F57510-AMMO/CTG, 7.62mm Advanced Armor Piercing, XM1158: This funding line supports the procurement of 7.62mm M1158 Advanced Armor-Piercing (ADVAP) Ball Cartridges 4Ball/1 M62A1 Tracer linked Cartridges.											
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. Developmental efforts on ADVAP ammunition in calibers below 7.62mm, starting in FY 2019, will follow a similar strategy as the 7.62mm with planned accelerated FY 2020 MS B achievement.											
Next Generation Squad Weapon (NGSW) Family of Ammunition: The Next Generation Squad Weapon (NGSW) ammunition program will utilize competitive development contracts with two competing concepts/designs for the Enhanced Performance Round (EPR) variant and the Advanced Armor-Piercing (ADVAP) variant. Two contractors will be funded through Engineering & Manufacturing Development (EMD) with a final down-select to one design prior by Milestone C in FY 2022. Follow-on development efforts for additional NSGW ammunition variants including tracer ammunition, blank ammunition, and reduced range ammunition will start in FY 2022.											
E. Performance Metrics											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
ADVAP Program Manager Maneuver Ammunition Systems (PM MAS) - Labor & Travel	Various	Picatinny Arsenal : New Jersey	-	0.190		0.200		0.242		-		0.242	Continuing	Continuing	Continuing
ADVAP Raw Materials	Various	TW : New Jersey	-	3.196		3.161		3.200		-		3.200	Continuing	Continuing	Continuing
ADVAP Facilitization and Prototyping	MIPR	Picatinny Arsenal : New Jersey	-	1.142		1.200		1.200		-		1.200	Continuing	Continuing	Continuing
NGSW Program Manager Maneuver Ammunition Systems (PM MAS) - Labor & Travel	Various	Picatinny Arsenal : New Jersey	-	-		-		0.219		-		0.219	Continuing	Continuing	Continuing
NGSW EMD Contract (Vendor 1)	C/CPFF	To Be Determined : To Be Determined	-	-		-		2.125		-		2.125	0.000	2.125	-
NGSW EMD Contract (Vendor 2)	C/CPFF	To Be Determined : To Be Determined	-	-		-		2.125		-		2.125	0.000	2.125	-
Subtotal			-	4.528		4.561		9.111		-		9.111	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
ADVAP Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	-	4.687		2.205		4.303		-		4.303	Continuing	Continuing	Continuing
ADVAP Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	-	1.566		1.250		1.010		-		1.010	Continuing	Continuing	Continuing
ADVAP Manufacturing Support	C/FP	UTRS : New Jersey	-	0.600		2.400		-		-		-	0.000	3.000	-
ADVAP Facilitization Support	MIPR	Armament Research Development and Engineering Center :	-	0.618		-		-		-		-	0.000	0.618	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development						Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo			
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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													
NGSW Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	-	-		-		2.000		-		2.000	Continuing	Continuing	Continuing
NGSW Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	-	-		-		0.300		-		0.300	Continuing	Continuing	Continuing
Subtotal			-	7.471		5.855		7.613		-		7.613	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
ADVAP U.S. Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	-	0.103		0.300		0.870		-		0.870	Continuing	Continuing	Continuing
ADVAP Limited User Test	MIPR	Maneuver Battle Labs : Fort Benning, Georgia	-	-		-		0.150		-		0.150	Continuing	Continuing	Continuing
ADVAP ARDEC Testing	MIPR	ARDEC : Picatinny Arsenal, New Jersey	-	0.350		0.855		0.650		-		0.650	0.000	1.855	-
ADVAP ARL Live Fire Test and Evaluation	MIPR	ARL : Aberdeen, Maryland	-	-		-		1.125		-		1.125	0.000	1.125	-
NGSW U.S. Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	-	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
NGSW ARDEC Testing	MIPR	ARDEC : Picatinny Arsenal, New Jersey	-	-		-		0.300		-		0.300	Continuing	Continuing	Continuing
NGSW ARL Test and Evaluation	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		-		0.700		-		0.700	Continuing	Continuing	Continuing
Subtotal			-	0.453		1.155		4.295		-		4.295	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army										Date: February 2018			
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development					Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo			
	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	12.452		11.571		21.019		-		21.019	Continuing	Continuing	N/A
Remarks													

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity

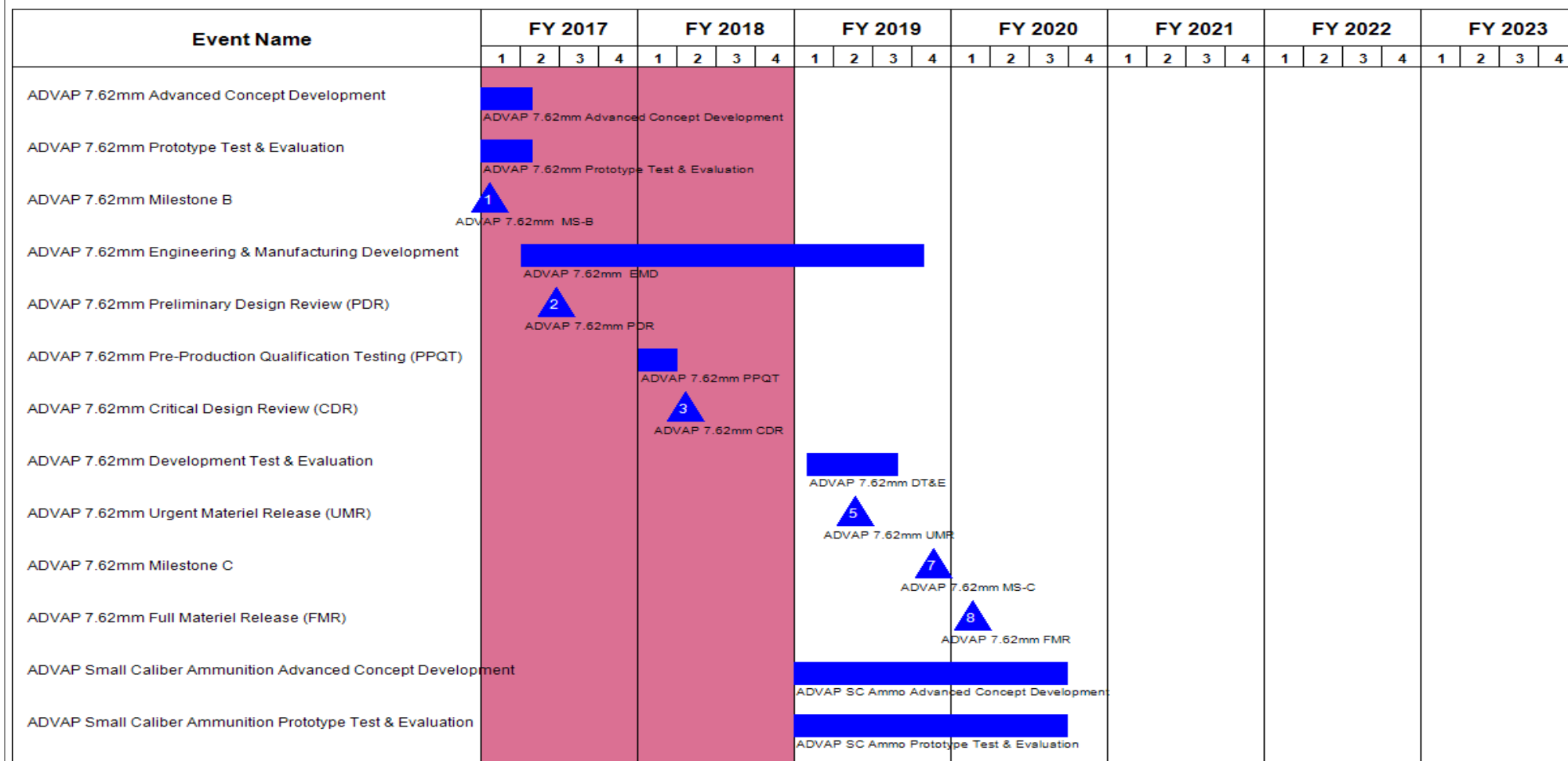
2040 / 5

R-1 Program Element (Number/Name)

PE 0604802A / Weapons and Munitions Engineering Development

Project (Number/Name)

EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
ADVAP Small Caliber Ammunition Materiel Development Decision (MDD)																												
ADVAP Small Caliber Ammunition Milestone B																												
ADVAP Small Caliber Ammunition Engineering & Manufacturing Development																												
ADVAP Small Caliber Ammunition Preliminary Design Review (PDR)																												
ADVAP Small Caliber Ammunition Pre-Production Qualification Testing (PPQT)																												
ADVAP Small Caliber Ammunition Critical Design Review (CDR)																												
ADVAP Small Caliber Ammunition Milestone C																												
NGSW Ammo Concept Development																												
NGSW Ammo Milestone B																												
NGSW Ammo Engineering & Manufacturing Development																												
NGSW Ammo Developmental Testing (DT)																												
NGSW Ammo Preliminary Design Review (PDR)																												
NGSW Ammo Pre-Production Qualification Testing (PPQT)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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 Critical Design Review (CDR)																	12 NGSW Ammo CDR											
NGSW Ammo Production Qualification Testing (PQT)																	NGSW Ammo PQT											
NGSW Ammo Milestone C																	13 NGSW Ammo MS-C											
NGSW Ammo First Unit Equipped																	15 NGSW Ammo FUE											
NGSW Family of Ammo Milestone B																	16 NGSW FoA MS-B											
NGSW Family of Ammo Concept Development																	NGSW FoA Concept Develo											

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</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
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 Full Materiel Release (FMR)	1	2020	1	2020
ADVAP Small Caliber Ammunition Advanced Concept Development	1	2019	3	2020
ADVAP Small Caliber Ammunition Prototype Test & Evaluation	1	2019	3	2020
ADVAP Small Caliber Ammunition Materiel Development Decision (MDD)	1	2019	1	2019
ADVAP Small Caliber Ammunition Milestone B	4	2020	4	2020
ADVAP Small Caliber Ammunition Engineering & Manufacturing Development	4	2020	1	2023
ADVAP Small Caliber Ammunition Preliminary Design Review (PDR)	2	2021	2	2021
ADVAP Small Caliber Ammunition Pre-Production Qualification Testing (PPQT)	4	2021	2	2022
ADVAP Small Caliber Ammunition Critical Design Review (CDR)	3	2022	3	2022
ADVAP Small Caliber Ammunition Milestone C	1	2023	1	2023
NGSW Ammo Concept Development	1	2019	2	2019
NGSW Ammo Milestone B	2	2019	2	2019

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo		
	Start		End	
Events	Quarter	Year	Quarter	Year
NGSW Ammo Engineering & Manufacturing Development	2	2019	1	2022
NGSW Ammo Developmental Testing (DT)	3	2019	4	2019
NGSW Ammo Preliminary Design Review (PDR)	3	2020	3	2020
NGSW Ammo Pre-Production Qualification Testing (PPQT)	3	2020	1	2021
NGSW Ammo Critical Design Review (CDR)	2	2021	2	2021
NGSW Ammo Production Qualification Testing (PQT)	3	2021	4	2021
NGSW Ammo Milestone C	1	2022	1	2022
NGSW Ammo First Unit Equipped	4	2022	4	2022
NGSW Family of Ammo Milestone B	4	2022	4	2022
NGSW Family of Ammo Concept Development	4	2022	1	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP7 / Aviation Airborne Expandable Countermeasures			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EP7: Aviation Airborne Expandable Countermeasures	-	0.000	7.500	7.222	-	7.222	6.920	2.113	16.207	0.000	0.000	39.962
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project will support Integrated System Design (ISD), System Capability (SC) and Manufacturing Process Demonstrations (MPD) on current pyrotechnic munitions and tunable pyrotechnic aircraft counter measures and decoys. 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, engineering to reduce size and weight, 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, pen flares, hand held signals, trip flares, simulators, marine markers, smoke pots, smoke grenades, rail road flares and other type of emergency/distress devices, aircraft expendables (to include Radio Frequency (RF) expendables), and primers used in munitions systems.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Improvements to countermeasure flares	-	7.500	7.222	-	7.222
Description: This program will develop improvements to legacy countermeasure flare solutions and qualify them for Army use.					
FY 2018 Plans: Conduct flight effectiveness testing on Army platforms based on Modeling and Simulation (M&S) results. Generate necessary documentation to support Airworthiness (AWR) and fielding of new countermeasure solutions.					
FY 2019 Base Plans: Conduct flight effectiveness testing on Army platforms based on M&S results. Generate necessary documentation to support Airworthiness (AWR) and fielding of new countermeasure solutions. Develop required documentation to support milestone decision.					
FY 2018 to FY 2019 Increase/Decrease Statement: FY19 funding decreased by \$278k due to reduced testing requirements and decreased management costs.					
Accomplishments/Planned Programs Subtotals	-	7.500	7.222	-	7.222

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018	
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP7 / Aviation Airborne Expandable Countermeasures			
C. Other Program Funding Summary (\$ in Millions)											
			<u>FY 2019</u>	<u>FY 2019</u>	<u>FY 2019</u>					<u>Cost To</u>	
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>Base</u>	<u>OCO</u>	<u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Complete</u>	<u>Total Cost</u>
• EB9: EB9 - Tunable Pyrotechnic Aircraft Countermeasure Flares	2.367	1.000	2.500	-	2.500	1.200	-	-	-	0.000	7.067
Remarks											
D. Acquisition Strategy											
The Acquisition strategy is under development and Milestone Decision Authority (MDA) was approved in 3Q FY2017. It is anticipated that these items will be restricted to the National Technology and Industrial Base (NTIB).											
E. Performance Metrics											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army													Date: February 2018		
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP7 / Aviation Airborne Expandable Countermeasures					
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Management	MIPR	PM CCS : Picatinny Arsenal	-	-		0.100		0.022	Jan 2019	-		0.022	0.000	0.122	-
Subtotal			-	-		0.100		0.022		-		0.022	0.000	0.122	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	VARIOUS : VARIOUS	-	-		4.500	Jan 2018	4.500	Jan 2019	-		4.500	0.000	9.000	-
Subtotal			-	-		4.500		4.500		-		4.500	0.000	9.000	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	ARDEC : Picatinny Arsenal	-	-		0.800	Dec 2017	0.800	Dec 2018	-		0.800	0.000	1.600	-
Subtotal			-	-		0.800		0.800		-		0.800	0.000	1.600	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 & Evaluation	MIPR	AED : Redstone Arsenal	-	-		2.100		1.900	Apr 2019	-		1.900	0.000	4.000	-
Subtotal			-	-		2.100		1.900		-		1.900	0.000	4.000	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018				
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EP7 / Aviation Airborne Expandable Countermeasures						
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		7.500		7.222		-		7.222	0.000	14.722	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army																Date: February 2018												
Appropriation/Budget Activity 2040 / 5										R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development								Project (Number/Name) EP7 / Aviation Airborne Expandable Countermeasures										
Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Milestone A Cloud Countermeasures (CM)																												
Develop Modeling and Simulation CM solutions and payload configurations																												
Milestone A Rader Guided																												
Test & Evaluation of countermeasure solutions																												
Milestone B Cloud CM																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EP7 / <i>Aviation Airborne Expandable Countermeasures</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone A Cloud Countermeasures (CM)	4	2018	4	2018
Develop Modeling and Simulation CM solutions and payload configurations	4	2018	1	2020
Milestone A Rader Guided	4	2018	4	2018
Test & Evaluation of countermeasure solutions	1	2019	4	2020
Milestone B Cloud CM	1	2020	1	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EU4: 40mm HV Improved High Explosive Dual Purpose	-	0.292	3.191	7.210	-	7.210	13.055	2.935	2.313	0.000	0.000	28.996
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
40mm Improved High Explosive Dual Purpose (I-HEDP) is a new capability identified as a Warfighter requirement in the 40mm High Velocity I-HEDP Capability Development Document (CDD). The I-HEDP tactical cartridge provides the warfighter with the ability to achieve the required lethal effects against enemy personnel in the open and to defeat personnel targets in defilade position. Additionally, the I-HEDP cartridge will be able to defeat unarmored and lightly armored vehicles. FY 2019 funding supports Engineering and Manufacturing Development (EMD) activities including source selection, contract award, Design Engineering Tests (DET), and technical design.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Pre Engineering Manufacturing Development Activities								0.292	-	-	-	-
Description: Creating performance specifications, test plans, and Milestone B preparations ahead of Engineering and Manufacturing Development (EMD) award.												
Title: Engineering Manufacturing Development Activities								-	3.191	-	-	-
Description: After Milestone B approval, Request for Proposal (RFP) documents and EMD Bid Sample planning and testing needs to be accomplished.												
FY 2018 Plans: Funding in FY 2018 supports key activities in preparation for the Milestone B decision, Request for Proposal, the Engineering and Manufacturing Development (EMD) Bid sample testing and initiation of technical design activities.												
FY 2018 to FY 2019 Increase/Decrease Statement: Project EU4 was a new start in FY 2017. FY 2018 funding increased for planned EMD activities.												
Title: Engineering Manufacturing Development Award								-	-	7.210	-	7.210
Description: Following RFP release and bid sample test, contract award and engineering tests will be conducted.												

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018			
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EU4 / <i>40mm HV Improved High Explosive Dual Purpose</i>				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<i>FY 2019 Base Plans:</i> Funding in FY 2019 supports EMD activities including Source Selection, Contract Award, Design Engineering Tests (DET), and technical design.						
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> FY 2019 funding supports continuation of planned EMD activities.						
Accomplishments/Planned Programs Subtotals		0.292	3.191	7.210	-	7.210
C. Other Program Funding Summary (\$ in Millions) N/A						
Remarks						
D. Acquisition Strategy The 40mm High Velocity Improved High Explosive Dual Purpose (I-HEDP) cartridge will be developed through a competitive Engineering and Manufacturing Development (EMD) program. Milestone B approval will be followed by the award to one EMD contractor after the bid sample testing and source selection evaluation. The contractor will mature the I-HEDP cartridge through Design Engineering Testing (DET). Shortcomings and deficiencies will be corrected prior to subjecting the final design to the Developmental Test & Evaluation (DT&E). The test results will support the documentation for Milestone C and Type Classification-Limited Procurement (TC-LP) scheduled for FY 2021. After Milestone C is achieved, a contract will be awarded for Low Rate Initial Production (LRIP) followed by two production year options.						
E. Performance Metrics N/A						

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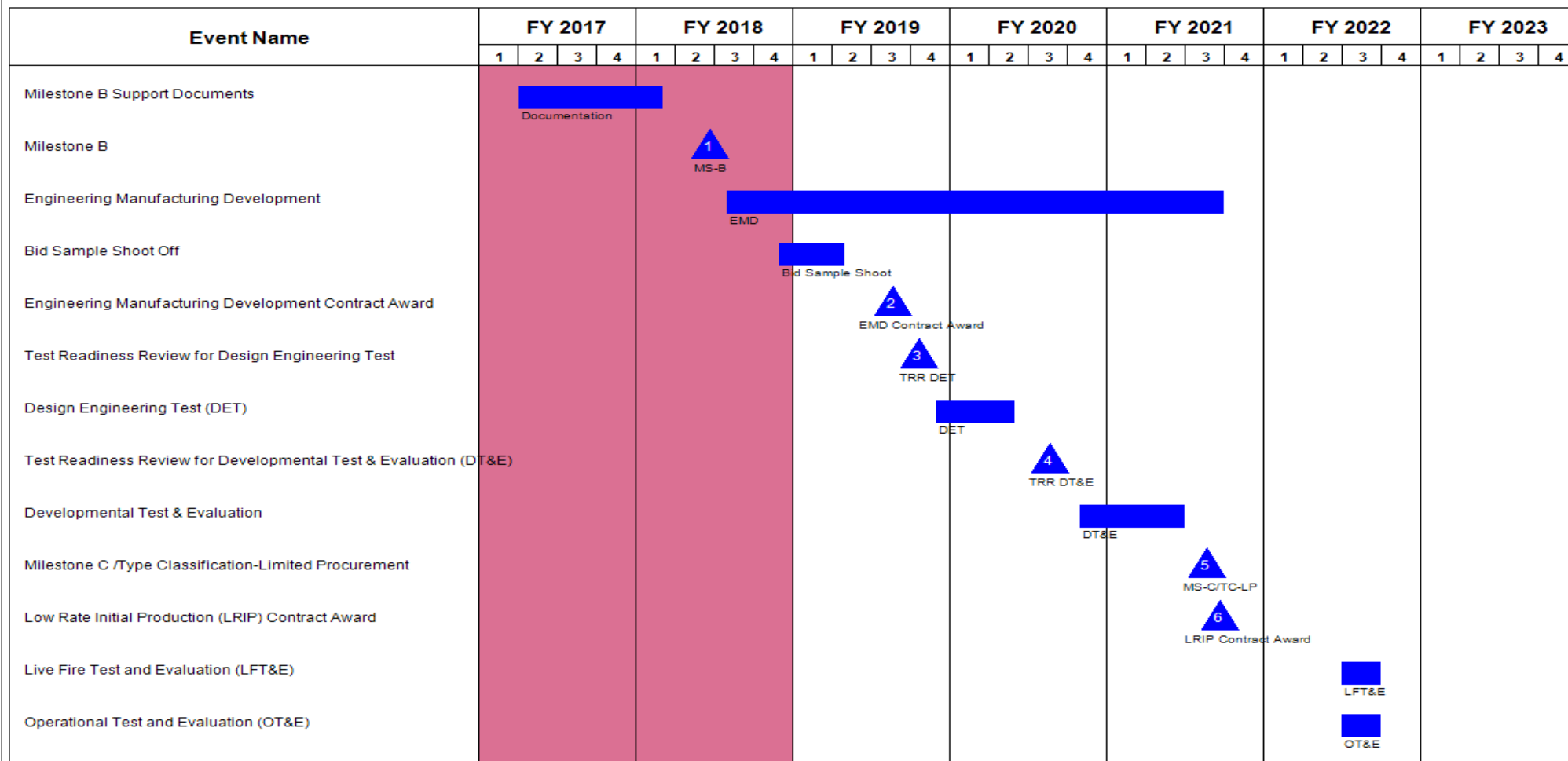
Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	-	0.014		0.487		0.372		-		0.372	Continuing	Continuing	Continuing
Contractor 1 EMD Award	C/FFP	TBD : TBD	-	-		-		2.000		-		2.000	Continuing	Continuing	-
Subtotal			-	0.014		0.487		2.372		-		2.372	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armament Research Development Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	-	0.278		1.213		2.050		-		2.050	Continuing	Continuing	Continuing
Subtotal			-	0.278		1.213		2.050		-		2.050	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Bid Sample Test	MIPR	Aberdeen Test Center : Aberdeen, MD	-	-		1.491		-		-		-	Continuing	Continuing	Continuing
Design Engineering Test (DET)	MIPR	Aberdeen Test Center : Aberdeen Proving Ground, MD	-	-		-		2.788		-		2.788	0.000	2.788	-
Subtotal			-	-		1.491		2.788		-		2.788	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	0.292		3.191		7.210		-		7.210	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018			
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development			Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose				
	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	
Remarks										

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose	



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EU4 / <i>40mm HV Improved High Explosive Dual Purpose</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone B Support Documents	2	2017	1	2018
Milestone B	2	2018	2	2018
Engineering Manufacturing Development	3	2018	3	2021
Bid Sample Shoot Off	4	2018	2	2019
Engineering Manufacturing Development Contract Award	3	2019	3	2019
Test Readiness Review for Design Engineering Test	4	2019	4	2019
Design Engineering Test (DET)	4	2019	2	2020
Test Readiness Review for Developmental Test & Evaluation (DT&E)	3	2020	3	2020
Developmental Test & Evaluation	4	2020	2	2021
Milestone C /Type Classification-Limited Procurement	3	2021	3	2021
Low Rate Initial Production (LRIP) Contract Award	3	2021	3	2021
Live Fire Test and Evaluation (LFT&E)	3	2022	3	2022
Operational Test and Evaluation (OT&E)	3	2022	3	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EU6 / 155mm High Explosive Extended Range Artillery			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EU6: 155mm High Explosive Extended Range Artillery	-	0.000	0.000	6.926	-	6.926	4.943	2.966	0.000	0.000	0.000	14.835
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2019, PE 0603639A, Project EU1, Enhanced Lethality Cannon Munitions will transition to PE 0604802A, Project EU6, 155mm High Explosive Extended Range Artillery. This Project is not a New Start.

A. Mission Description and Budget Item Justification

The 155mm High Explosive Extended Range Artillery Projectile project will evaluate, develop and qualify extended range technologies, including the XM1113 in 39 caliber weapon systems with legacy propellants. The XM113 effort is a government owned materiel solution for long-range cannon artillery projectile that will increase range by 10km+ in 39 caliber weapon systems, and contain twice as much rocket motor grains as the current 155mm long range cannon projectile that is now obsolete. The XM1113 will leverage enhanced lethality cannon munition technologies to compensate for increased rocket motor volume. This design will utilize a high fragmentation steel body with a streamlined ogive and a high performance rocket motor. The projectile body is filled with an insensitive munition (IM) high explosive (HE) and a supplementary charge. FY 2019 will support the completion of the Developmental Test phase of Engineering & Manufacturing Development (EMD) and the completion of the Critical Design Review (CDR) in 4Q FY 2019.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: 155mm HE Rocket Assist Project (RAP) Extended Range	-	-	6.926	-	6.926
Description: Evaluate, Develop, and Qualify Extended Range Technologies.					
FY 2019 Base Plans: FY 2019 will support the completion of the Developmental Test phase of Engineering & Manufacturing Development (EMD) and the completion of the Critical Design Review (CDR) in 4Q FY 2019.					
FY 2018 to FY 2019 Increase/Decrease Statement: Increase in funding in FY 2019 due to continuation of XM1113 munitions from PE 0603639A, Project EU1 Enhanced Lethality Cannon Munitions for prototyping of enhanced lethality warhead technologies. This coincides with Technology Readiness Level 6 demonstration of XM1113 rocket motor technologies to feed into XM1113 EMD efforts.					
Accomplishments/Planned Programs Subtotals	-	-	6.926	-	6.926

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018	
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EU6 / 155mm High Explosive Extended Range Artillery			
C. Other Program Funding Summary (\$ in Millions)											
			<u>FY 2019</u>	<u>FY 2019</u>	<u>FY 2019</u>					<u>Cost To</u>	
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>Base</u>	<u>OCO</u>	<u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Complete</u>	<u>Total Cost</u>
• EU1: <i>Enhanced Lethality Cannon Munitions</i>	9.486	10.000	0.000	-	0.000	-	-	-	-	0.000	19.486
Remarks											
In FY 2019, PE 0603639A, Project EU1, Enhanced Lethality Cannon Munitions will transition to PE 0604802A, Project EU6, 155mm High Explosive Extended Range Artillery. This Project is not a New Start.											
D. Acquisition Strategy											
Prototyping will be awarded in 1Q FY 2019 through a DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) to multiple vendors (subcontractors to U.S. Government system integrator) through EMD. The U.S. Government will lead EMD effort to complete development in the 39 caliber weapon system in 3Q FY 2021.											
E. Performance Metrics											
NA											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EU6 I 155mm High Explosive Extended Range Artillery					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
XM1113 HE-RAP Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		-		3.000	Nov 2018	-		3.000	17.000	20.000	-
Subtotal			-	-		-		3.000		-		3.000	17.000	20.000	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
XM1113 Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		3.426	Oct 2018	-		3.426	11.400	14.826	-
Subtotal			-	-		-		3.426		-		3.426	11.400	14.826	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
XM1113 Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	-		-		0.500	Mar 2018	-		0.500	9.500	10.000	-
Subtotal			-	-		-		0.500		-		0.500	9.500	10.000	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		0.000		6.926		-		6.926	37.900	44.826	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army							Date: February 2018			
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development			Project (Number/Name) EU6 / 155mm High Explosive Extended Range Artillery				
	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	
Remarks										

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EU6 / 155mm High Explosive Extended Range Artillery	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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 MS-B									1																			
XM1113 Developmental Test (DT)																												
XM1113 Critical Design Review (CDR)																												
XM1113 Production Qualification Testing (PQT)																												
XM1113 MS-C																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EU6 / <i>155mm High Explosive Extended Range Artillery</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM1113 MS-B	1	2019	1	2019
XM1113 Developmental Test (DT)	1	2019	4	2019
XM1113 Critical Design Review (CDR)	4	2019	4	2019
XM1113 Production Qualification Testing (PQT)	1	2020	4	2021
XM1113 MS-C	4	2021	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EU7: Enhanced Lethality Cannon Munitions	-	0.000	20.500	7.915	-	7.915	7.908	7.907	0.000	0.000	0.000	44.230
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The Enhanced Lethality Cannon Munitions (ELCM) project will accelerate the qualification of Lithographic Fragmentation Technology (LFT) on the 155mm XM1128 high explosive projectile, per HQDA G-8 Directed Requirement for a Rapid Bridging Solution for the 155mm Dual Purpose Improved Conventional Munition 22 December 2016. The project addresses requirements for increased lethality of 155mm high explosive unitary projectiles (Initial Draft Requirements for the XM1128 with Lithographic Fragmentation Technology, 24 February 2017). The ELCM project will also 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 will support testing of the Israeli Military Industries (IMI) Systems M999 advanced cluster munition, per HQDA G-8 Directed Requirement for a Rapid Bridging Solution for the 155mm Dual Purpose Improved Conventional Munition 22 December 2016. The project will complete a lethality arena test on the M999 submunitions to be conducted at the IMI facility in Israel. FY 2019 will support the completion of the Product Qualification Testing (PQT) test series for the XM1128 and the finalization of the Capability Production Document (CPD) by 4Q FY 2019.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: 155mm XM1128 High Explosive Projectile								-	18.500	7.915	-	7.915
Description: Evaluate, Develop, and Qualify Enhanced Lethality Technologies.												
FY 2018 Plans: Accelerate and initiate Engineering & Manufacturing Development (EMD) of the XM1128 LFT. Complete EMD prototyping to begin Production Qualification Testing (PQT) series.												
FY 2019 Base Plans: FY 2019 will support the completion of the Product Qualification Testing (PQT) test series for the XM1128 and the finalization of the Capability Production Document (CPD) by 4Q FY 2019.												
FY 2018 to FY 2019 Increase/Decrease Statement: This is an accelerated program due to the continuation of XM1128 munitions transitioning from PE 0603639A Project EU1, Enhanced Lethality Cannon Munitions for prototyping of enhanced lethality warhead technologies.												
Title: 155mm M999 IMI Projectile with M99 Submunitions								-	2.000	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army				Date: February 2018	
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions	

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Description: M999 testing assessment of performance, safety, and UXO rates. FY 2018 Plans: Complete Fire Control Integration (FCI) for the M999. Conduct safety and performance testing. FY 2018 to FY 2019 Increase/Decrease Statement: This is an assessment program to evaluate non-developmental items and is a one time cost in FY 2018.					
Accomplishments/Planned Programs Subtotals	-	20.500	7.915	-	7.915

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• EU1: <i>Enhanced Lethality Cannon Munitions</i>	9.486	10.000	0.000	-	0.000	-	-	-	-	0.000	19.486

Remarks

D. Acquisition Strategy
 XM1128 High Explosive munition will be accelerated for qualification, per HQDA G-8 Directed Requirement for a Rapid Bridging Solution for the 155mm Dual Purpose Improved Conventional Munition (DPICM) 22 December 2016, as an inherent part of the Rapid Bridging solution for 155mm DPICM. Prototyping will be awarded beginning in 1Q FY 2018 through DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives to multiple vendors (subcontractors to U.S. Government system integrator) through EMD. The U.S. Government will lead EMD effort to complete development by end 1Q FY 2020. Milestone C approval is in 3Q FY 2020.

E. Performance Metrics
 N/A

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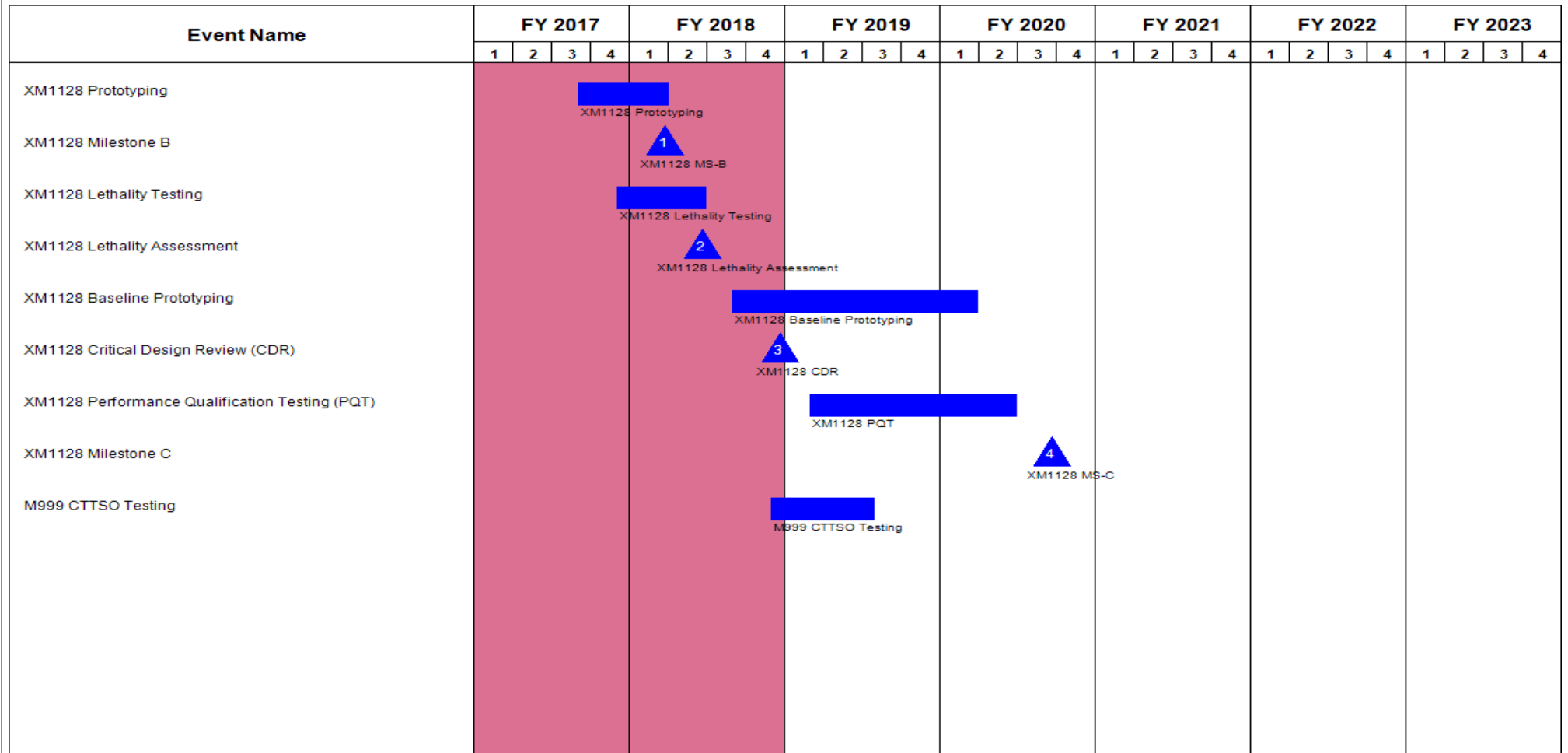
Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development						Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions			
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
XM1128 PQT Hardware	MIPR	Various : TBD	-	-		10.070		0.830		-		0.830	0.140	11.040	-
Subtotal			-	-		10.070		0.830		-		0.830	0.140	11.040	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
M999 Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		0.200		-		-		-	0.000	0.200	-
M999 Engineering Support	MIPR	Armament Reasech, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		1.800		-		-		-	0.000	1.800	-
XM1128 Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		1.000		-		-		-	0.000	1.000	-
XM1128 Engineering Support	MIPR	Armament Reasech Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		3.960		3.185	Mar 2019	-		3.185	1.377	8.522	-
XM1128 Firing Table Software Updates	MIPR	Armament Reasech Development and Engineering Center (ARDEC) : Adelphi, MD	-	-		-		2.900	Aug 2019	-		2.900	0.000	2.900	-
Subtotal			-	-		6.960		6.085		-		6.085	1.377	14.422	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions					
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
XM1128 Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	-		2.089		-		-		-	0.000	2.089	-
XM1128 Testing	MIPR	Naval Surface Warfare Center (NSWC) ? Dahlgren : Dahlgren, VA	-	-		1.031		0.400	Nov 2018	-		0.400	0.000	1.431	-
XM1128 Testing	MIPR	National Technical Systems (NTS) : Camden, AR	-	-		0.350		0.600	Nov 2018	-		0.600	0.000	0.950	-
Subtotal			-	-		3.470		1.000		-		1.000	0.000	4.470	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		20.500		7.915		-		7.915	1.517	29.932	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions	



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EU7 / <i>Enhanced Lethality Cannon Munitions</i>	

Schedule Details

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

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EU8 / Improved Multi-Option Fuze			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EU8: Improved Multi-Option Fuze	-	0.000	8.000	7.915	-	7.915	9.885	0.000	0.000	0.000	0.000	25.800
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Improved Multi-Option Fuze project will integrate the results of Budget Activity 04, Program Element 0603639A, Project EU2 and qualify/Type Classify (TC) new improved Multi-Option Fuzes (iMOFA/iMOFM) with Government-owned Next Generation Proximity Sensor (NGPS) capabilities containing built-in exportability attributes previously matured via OSD-sponsored tech base efforts under the Joint Fuze Technology Program and Defense Exportability Features (DEF) Congressional Pilot Program. Continuing FMS sales of non-precision artillery and mortar ammunition fuzes containing proximity technology will increase the incidence of reverse engineering (RE) and threat of electronic countermeasures (ECM). If realized, these threats will negate the current battlefield advantages of U.S. troops. This Project will develop and qualify safe, affordable, reliable Proximity/HoB fuzing solution for non-precision Cannon artillery and Mortar munitions that are resistant to adversary exploitation via ECM and RE threats.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Improved Multi-Option Fuze Development	-	8.000	7.915	-	7.915
Description: Develop and qualify improved multi-option fuze technologies.					
FY 2018 Plans: Prepare and award the Engineering and Manufacturing Development (EMD) contracts as well as the EMD design, development, and fabrication of initial improved Multi-option fuzes for follow-on engineering tests and qualification of new iMOFA/iMOFM TDP based on Government-owned Next Generation Proximity Sensor (NGPS) w/Built-In HOBf DEF technology.					
FY 2019 Base Plans: FY 2019 will support the preparation and incrementing of EMD contracts utilizing the DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) for preliminary iMOFM design and detailed iMOFA design, the fabrication of hardware and the conducting of developmental verification tests, the preparations for and execution of an iMOFM Preliminary Design Review (PDR) and an iMOFA Critical Design Review (CDR), and the completion of iMOFA Product Qualification Test (PQT) plans and the fabrication of test hardware.					
FY 2018 to FY 2019 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army				Date: February 2018							
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EU8 / Improved Multi-Option Fuze							
B. Accomplishments/Planned Programs (\$ in Millions)				FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total			
Continued level of effort in support of EMD contracts in FY 2019.											
Accomplishments/Planned Programs Subtotals				-	8.000	7.915	-	7.915			
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• EU2: Improved Multi-Option Fuze (iMOFA/iMOFM)	7.588	-	0.000	-	0.000	-	-	-	-	0.000	7.588
Remarks											
D. Acquisition Strategy											
Improved Multi-Option Fuze programs of record via subsequent Engineering and Manufacturing Development (EMD) program for Type Classification (TC) into existing multi- option fuzes for Cannon Artillery and Mortar Munitions with supporting detailed government-owned Technical Data Packages (TDPs) to enable "build to print" by Industry. Qualified iMOFA will be a Technology Readiness Level (TRL) 8 TC design with a mature TDP for production. Parallel iMOFM effort will be a qualified TRL 8 design and replace current MOFMs in appropriate ongoing production mortar cartridges.											
E. Performance Metrics											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development						Project (Number/Name) EU8 / Improved Multi-Option Fuze			
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Improved Multi-Option Fuze Development and Component Prototypes	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		0.700	Nov 2017	-		-		-	0.000	0.700	-
Improved Multi-Option Fuze Test Hardware & PQT Support	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		4.300	Jun 2018	5.915	Nov 2018	-		5.915	7.000	17.215	-
Subtotal			-	-		5.000		5.915		-		5.915	7.000	17.915	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		0.500		-		-		-	0.000	0.500	-
Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		0.500	Nov 2018	-		0.500	0.350	0.850	-
Subtotal			-	-		0.500		0.500		-		0.500	0.350	1.350	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Improved Multi-Option Fuze Test and Evaluations	MIPR	Armament Research, Development and Engineering Center	-	-		2.200	Nov 2017	0.900	Nov 2018	-		0.900	0.600	3.700	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development						Project (Number/Name) EU8 / Improved Multi-Option Fuze			
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
		(ARDEC) : Picatinny Arsenal, NJ													
Improved Multi-Option Fuze Test and Evaluations	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	-		0.200	Nov 2017	0.500	Nov 2018	-		0.500	1.950	2.650	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	U.S. Army Research Lab (ARL) : Adelphi, MD	-	-		0.100	Nov 2017	0.100	Nov 2018	-		0.100	0.100	0.300	-
Subtotal			-	-		2.500		1.500		-		1.500	2.650	6.650	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		8.000		7.915		-		7.915	10.000	25.915	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EU8 / Improved Multi-Option Fuze	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
Identify, Develop, and Prototype Candidate for Technology Solution; BA4 EU2																												
Conduct Performance-Related Developmental Tests; BA4 PE 0603639A EU2																												
Evaluate Prototype Solution & Transition Technology; BA4 PE 0603639A EU2																												
Fabricate Prototypes; BA5 PE 0604802A EU8																												
Conduct Evaluations and Design Reviews; BA5 PE 0604802A EU8																												
Fabricate System Level Qualification Hardware; BA5 PE 0604802A EU8																												
Safety, Reliability and Environmental Testing; BA5 PE 0604802A EU8																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EU8 / <i>Improved Multi-Option Fuze</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Identify, Develop, and Prototype Candidate for Technology Solution; BA4 EU2	3	2017	1	2019
Conduct Performance-Related Developmental Tests; BA4 PE 0603639A EU2	1	2018	3	2018
Evaluate Prototype Solution & Transition Technology; BA4 PE 0603639A EU2	2	2018	1	2019
Fabricate Prototypes; BA5 PE 0604802A EU8	2	2018	4	2018
Conduct Evaluations and Design Reviews; BA5 PE 0604802A EU8	4	2018	3	2019
Fabricate System Level Qualification Hardware; BA5 PE 0604802A EU8	3	2019	1	2020
Safety, Reliability and Environmental Testing; BA5 PE 0604802A EU8	1	2020	2	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EW1 / 40mm Low Velocity Ammunition			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EW1: 40mm Low Velocity Ammunition	-	0.000	9.678	13.269	-	13.269	14.032	21.302	1.482	0.000	0.000	59.763
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note												
Funds in the Program Element 0604802A, Project EW1 program include both the 40mm Low Velocity High Explosive Air Burst (HEAB) XM1166 and 40mm Low Velocity Door Breach (DB) XM1167 funds beginning in FY 2018. The DB XM1167 funds will be on this line until a separate funding line is established. The 40mm Door Breach Program is a new start in FY 2018.												
A. Mission Description and Budget Item Justification												
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 40mm LV HEAB tactical cartridge allows the warfighter to engage targets at increased effective ranges using the 40mm M203/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 at increased effective ranges with greater accuracy and lethality. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel at increased ranges 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 2019 supports Engineering and Manufacturing Development (EMD) effort for competing prototypes and continues EMD design activities.												
The 40mm Low Velocity (LV) Door Breach (DB), XM1167, cartridge allows the grenadier to conduct a ballistic breach of an existing door creating 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 breaching operations; allowing the Warfighter to create an entry point in a structure allowing an assault element to enter and begin clearing operations, which is the most difficult type of operation 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 2019 supports Design Engineering Testing (DET) and Developmental Test and Evaluation (DT&E).												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: 40mm Low Velocity High Explosive Air Burst (HEAB), XM1166								-	5.500	12.269	-	12.269
Description: Engineering Manufacturing Development												
FY 2018 Plans:												

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army							Date: February 2018				
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development			Project (Number/Name) EW1 / 40mm Low Velocity Ammunition				
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
FY 2018 Award two contracts for competing prototypes and activities will include fabrication and testing of prototype hardware for design optimization. FY 2019 Base Plans: FY 2019 activities include the first LV-HEAB design, a Test Readiness Review (TRR), Design Engineering Test (DET 1) build and DET 1 Testing. FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 funding required for continued development and start of testing.											
Title: 40mm Low Velocity Door Breach (DB), XM1167 Description: Engineering Manufacturing Development Activities FY 2018 Plans: FY 2018 primary activities include Milestone B approval and Bid Sample Test competition. Activities in support of contract award include developing performance specifications, releasing the Request for Proposals, evaluating proposals, and awarding a single contract. FY 2019 Base Plans: FY 2019 activities include a Test Readiness Review (TRR), Design Engineering Testing (DET), and Developmental Test & Evaluation (DT&E). FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 funding required for continued testing and evaluation of the 40mm door breaching round ammunition.							-	4.178	1.000	-	1.000
Accomplishments/Planned Programs Subtotals							-	9.678	13.269	-	13.269
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• 694: Medium Caliber Ammunition 0603639A 694	2.170	-	0.000	-	0.000	-	-	-	-	0.000	2.170
• E71005: CTG, 40mm LV, IRAP	-	-	0.000	-	0.000	-	-	16.082	15.594	0.000	31.676
Remarks											

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition
D. Acquisition Strategy <p>The HEAB cartridge will be developed through a competitive Engineering and Manufacturing Development (EMD) program. As part of the pre-EMD activities, Cooperative Research and Development Agreement (CRADA) Testing with contractors will occur to evaluate potential designs. For EMD, the Government anticipates awarding two Full and Open competitive contracts. After Developmental Test & Evaluation (DT&E) the government will down-select to a single contractor for Low Rate Initial Production (LRIP) and two production year options.</p> <p>The Door Breach cartridge will be developed through a Competitive Bid Sample Test followed by a single award for an EMD program, which will consist of a 12-month qualification effort.</p> E. Performance Metrics N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) EW1 / 40mm Low Velocity Ammunition					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) labor and travel	Various	Picatinny Arsenal : NJ	-	-		0.600		-		-		-	Continuing	Continuing	Continuing
Contractor 1 40mm LV HEAB XM1166	C/CPFF	TBD : TBD	-	-		1.896		4.562		-		4.562	0.000	6.458	-
Contractor 2 40mm LV HEAB XM1166	C/CPFF	TBD : TBD	-	-		1.896		4.562		-		4.562	0.000	6.458	-
Project Manager Maneuver Ammunition Systems (PM MAS) labor and travel 40mm LV Door Breach XM1167	Various	Picatinny Arsenal : NJ	-	-		0.630		-		-		-	Continuing	Continuing	Continuing
Contractor 1 40mm LV Door Breach XM1167	C/FFP	TBD : TBD	-	-		1.735		0.600		-		0.600	0.000	2.335	-
Subtotal			-	-		6.757		9.724		-		9.724	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armament Research Development Engineering Center (ARDEC) - 40mm LV HEAB XM1166	MIPR	Picatinny Arsenal : NJ	-	-		1.108		2.351		-		2.351	Continuing	Continuing	Continuing
Armament Research Development Engineering Center (ARDEC) - 40mm LV Door Breach XM1167	MIPR	Picatinny Arsenal : NJ	-	-		1.257		0.300		-		0.300	Continuing	Continuing	Continuing
Subtotal			-	-		2.365		2.651		-		2.651	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development						Project (Number/Name) EW1 / 40mm Low Velocity Ammunition			
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Bid Sample Test 40mm LV Door Breach XM1167	MIPR	TBD : TBD	-	-		0.556		-		-		-	0.000	0.556	-
DT&E 40mm LV Door Breach XM1167	MIPR	TBD : TBD	-	-		-		0.100		-		0.100	0.000	0.100	-
DET 1 LV HEAB XM1166	MIPR	TBD : TBD	-	-		-		0.794		-		0.794	0.000	0.794	-
Subtotal			-	-		0.556		0.894		-		0.894	0.000	1.450	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		9.678		13.269		-		13.269	Continuing	Continuing	N/A
Remarks															

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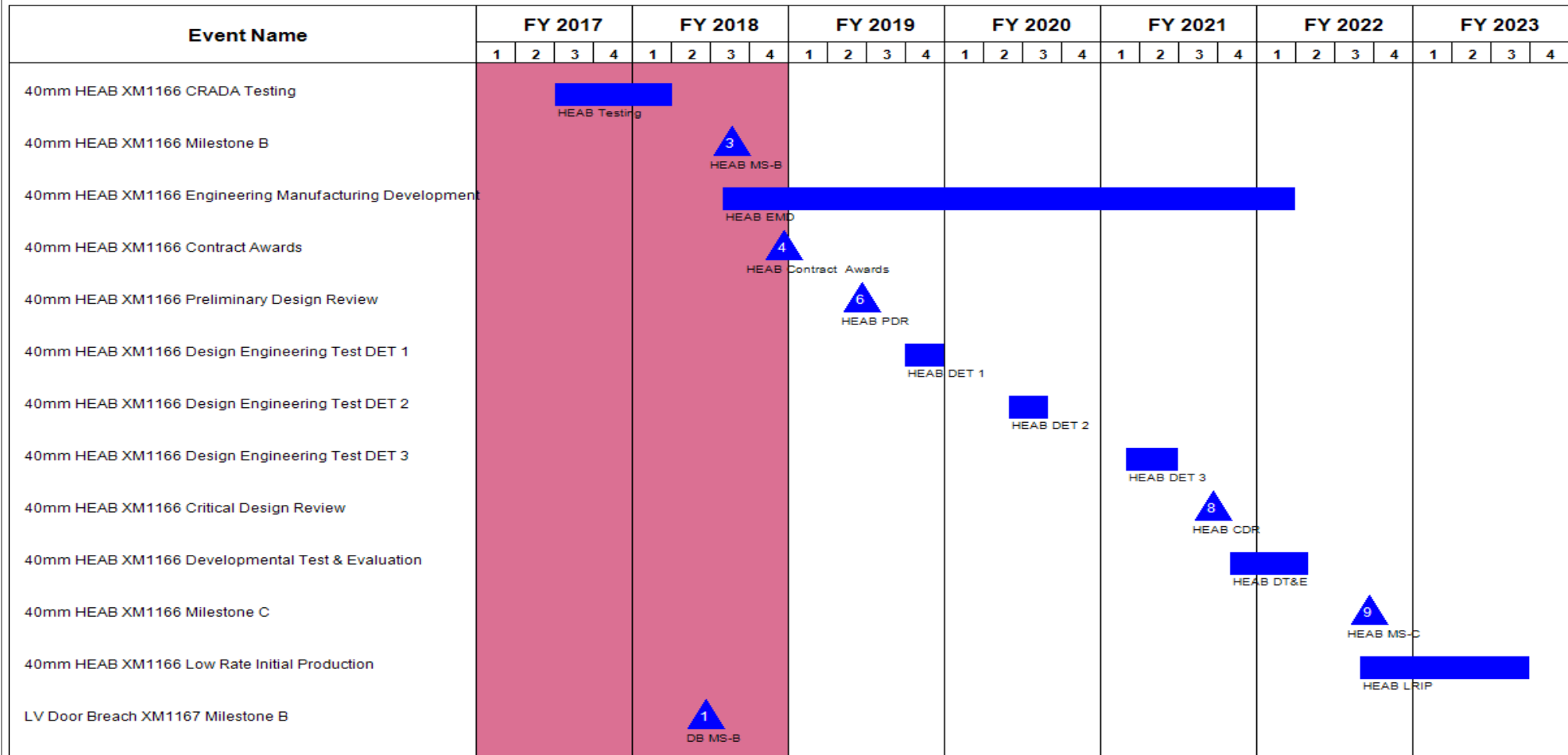
Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity
2040 / 5

R-1 Program Element (Number/Name)
PE 0604802A / Weapons and Munitions
Engineering Development

Project (Number/Name)
EW1 / 40mm Low Velocity Ammunition



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) EW1 / 40mm Low Velocity Ammunition	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
LV Door Breach XM1167 Request For Proposal Release								2 DB RFP																				
LV Door Breach XM1167 Bid Sample Test																												
LV Door Breach XM1167 Engineering Manufacturing Development Contract Award																												
LV Door Breach XM1167 Engineering Manufacturing Development																												
LV Door Breach XM1167 Developmental Test & Evaluation																												
LV Door Breach XM1167 Milestone C																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) EW1 / <i>40mm Low Velocity Ammunition</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
40mm HEAB XM1166 CRADA Testing	3	2017	1	2018
40mm HEAB XM1166 Milestone B	3	2018	3	2018
40mm HEAB XM1166 Engineering Manufacturing Development	3	2018	1	2022
40mm HEAB XM1166 Contract Awards	4	2018	4	2018
40mm HEAB XM1166 Preliminary Design Review	2	2019	2	2019
40mm HEAB XM1166 Design Engineering Test DET 1	4	2019	4	2019
40mm HEAB XM1166 Design Engineering Test DET 2	2	2020	3	2020
40mm HEAB XM1166 Design Engineering Test DET 3	1	2021	2	2021
40mm HEAB XM1166 Critical Design Review	3	2021	3	2021
40mm HEAB XM1166 Developmental Test & Evaluation	4	2021	2	2022
40mm HEAB XM1166 Milestone C	3	2022	3	2022
40mm HEAB XM1166 Low Rate Initial Production	3	2022	3	2023
LV Door Breach XM1167 Milestone B	2	2018	2	2018
LV Door Breach XM1167 Request For Proposal Release	3	2018	3	2018
LV Door Breach XM1167 Bid Sample Test	3	2018	4	2018
LV Door Breach XM1167 Engineering Manufacturing Development Contract Award	4	2018	4	2018
LV Door Breach XM1167 Engineering Manufacturing Development	4	2018	4	2019
LV Door Breach XM1167 Developmental Test & Evaluation	3	2019	4	2019
LV Door Breach XM1167 Milestone C	1	2020	1	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) FA6 / 30mm Lethality			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FA6: 30mm Lethality	-	0.000	12.000	13.851	-	13.851	8.897	11.860	6.918	0.000	0.000	53.526
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note 30mm Lethality is not a new start in FY 2018. In FY 2018 Program Element (PE) 0603639A, Project 694, will transition to PE 0604802A, Project FA6.												
A. Mission Description and Budget Item Justification The 30mm Lethality Project funds development of a suite of 30x173mm caliber cartridges, which includes anti-personnel tactical and training cartridges and anti-materiel tactical and training cartridges. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV) and any Army Fighting Vehicles that are equipped with a 30x173mm weapon system. The tactical cartridges will provide an organic direct fire capability to support infantry at a greater range and will improve lethality when engaging dismounted infantry and like armored vehicles. 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 for Increased Lethality. FY 2019 funding will continue to support the ammunition qualification activities and development of performance specifications in support of the 30x173mm Programmable Airburst Munitions - Tracer (PABM-T) Urgent Materiel Release (UMR). FY 2019 effort also includes activities for developing/qualifying a 30x173mm Programmable Airburst Munition (PABM) along with an initial Design Engineering Test (DET). The objective is to field airburst capable 30x173mm cartridges and programming/communication units for use in Stryker ICV and/or Army Future Fighting Vehicles.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: 30X173mm Suite of Ammunition								-	12.000	13.851	-	13.851
Description: Engineering and Manufacturing Development Preparatory Activities and Ammunition Qualification Activities.												
FY 2018 Plans: FY 2018 primary activities include awarding the contract to purchase qualification hardware for suite of four ammunition and preparing for contracts to develop/qualify a 30x173mm Programmable Airburst Munition (PABM).												
FY 2019 Base Plans: FY 2019 primary activities include initiation of Design Engineering Testing (DET) and Design Verification Testing (DVT) of the 30x173mm anti-personnel and anti-personnel training cartridges, as well as Development Contract Awards and DET of the 30x173mm Programmable Airburst Munition (PABM).												
FY 2018 to FY 2019 Increase/Decrease Statement:												

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) FA6 / 30mm Lethality				
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Increase will allow for the continued development of Stryker ammunition.												
Accomplishments/Planned Programs Subtotals								-	12.000	13.851	-	13.851
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost	
• E07610: CTG, 30MM, Progrmabl Air Burst Mun, Mk310, single	-	-	17.536	-	17.536	14.546	11.565	17.509	19.497	0.000	80.653	
• E07306: CTG, 30MM, TP-T, Mk239, single	6.437	14.550	0.000	3.000	3.000	7.870	3.000	11.188	3.000	0.000	49.045	
• E07406: CTG, 30mm Hi Expl Incendry-T(HEI-T), Mk238	9.176	14.300	8.281	6.000	14.281	8.430	14.588	12.978	12.980	0.000	86.733	
• E09191: CTG, 30MM, TPFSDS- T, Mk317 (sabot trnr), single	5.581	15.000	11.123	4.000	15.123	-	15.619	-	11.621	0.000	62.944	
• E09292: CTG, 30MM, APFSDS-T, Mk258, single	13.754	25.500	13.447	12.000	25.447	13.660	25.888	26.111	26.050	0.000	156.410	
Remarks												
D. Acquisition Strategy												
A Request for Proposal (RFP) will be sent to industry soliciting responses to the requirements of Army Performance Specifications for the following items: 30x173mm anti-materiel tactical cartridge, 30x173mm anti-materiel training cartridge, 30x173mm anti-personnel tactical cartridge, and 30x173mm anti-personnel training cartridge. Contracts will be awarded to viable contractors for the development and qualification of each family of cartridges (anti-personnel family and anti-materiel family). Contractor designs will be subjected to Design Verification Tests. Based on technical performance/maturity and cost, production contracts may be awarded for each family of cartridges. The objective is to qualify two contract sources for the each cartridge.												
In support of the 30x173mm programmable airburst munition (PABM), an RFP will be sent to industry. Multiple contracts will be awarded for development and design engineering tests. The Government will down-select and award a single contract to complete Developmental Test and Evaluation (DT&E) in support of Milestone C.												
E. Performance Metrics												
N/A												

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) FA6 / 30mm Lethality					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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) labor and travel	Various	Picatinny Arsenal : NJ	-	-		0.400		0.400		-		0.400	Continuing	Continuing	Continuing
Ammo Development/ Qualification Contract	Option/ TBD	TBD : TBD	-	-		8.000		10.551		-		10.551	Continuing	Continuing	Continuing
Subtotal			-	-		8.400		10.951		-		10.951	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Armament Research, Development, and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	-	-		2.600		1.900		-		1.900	Continuing	Continuing	Continuing
Subtotal			-	-		2.600		1.900		-		1.900	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Qualification Testing	MIPR	Aberdeen Proving Ground : Aberdeen Proving Ground, MD	-	-		-		1.000		-		1.000	Continuing	Continuing	Continuing
Design Engineering Test 1 (DET 1)	MIPR	Aberdeen Proving Grounds : Aberdeen Proving Ground, MD	-	-		1.000		-		-		-	0.000	1.000	-
Subtotal			-	-		1.000		1.000		-		1.000	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development					Project (Number/Name) FA6 / 30mm Lethality			
	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		12.000		13.851		-		13.851	Continuing	Continuing	N/A

Remarks

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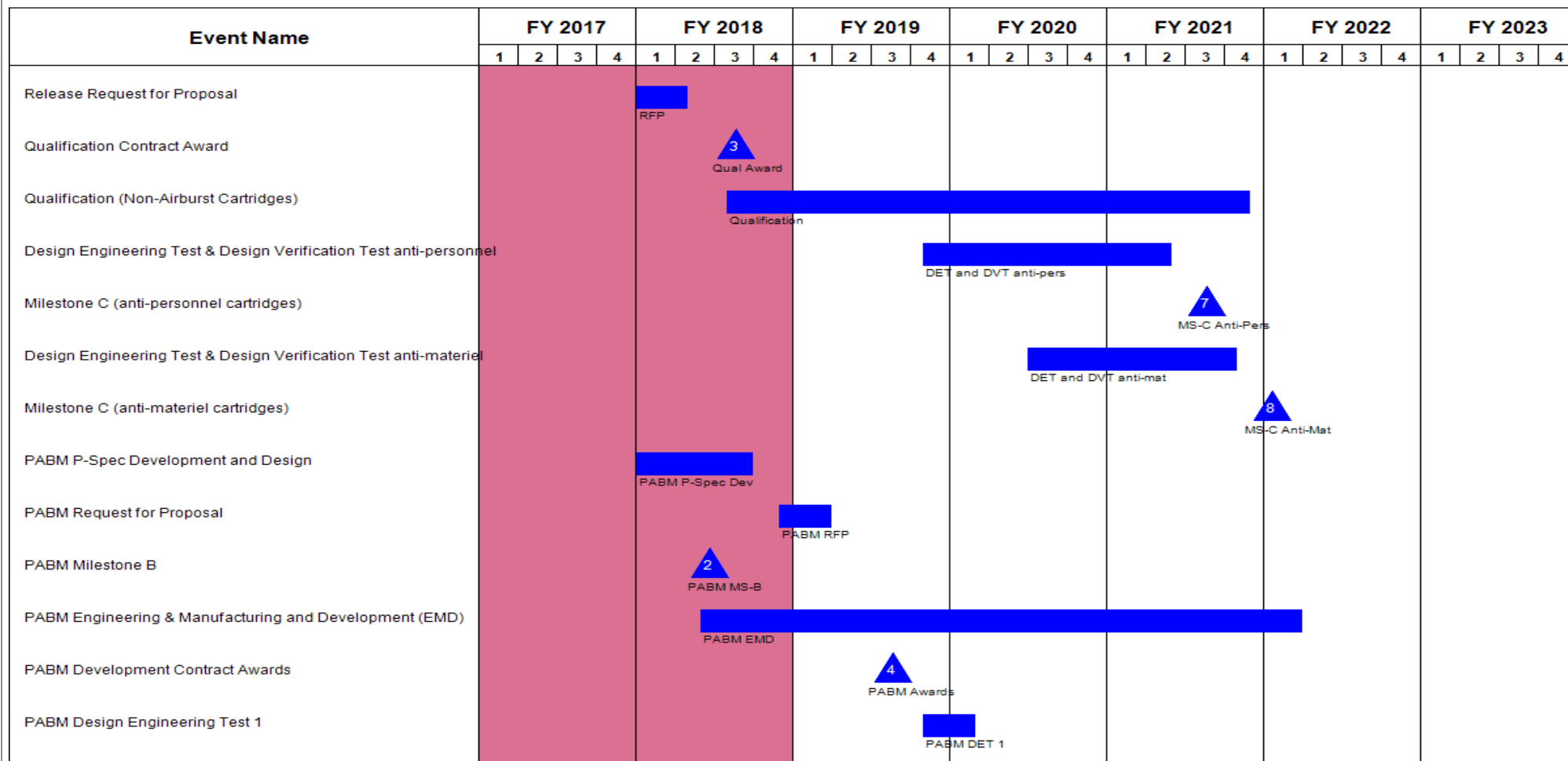
Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity
2040 / 5

R-1 Program Element (Number/Name)
PE 0604802A / Weapons and Munitions
Engineering Development

Project (Number/Name)
FA6 / 30mm Lethality



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity

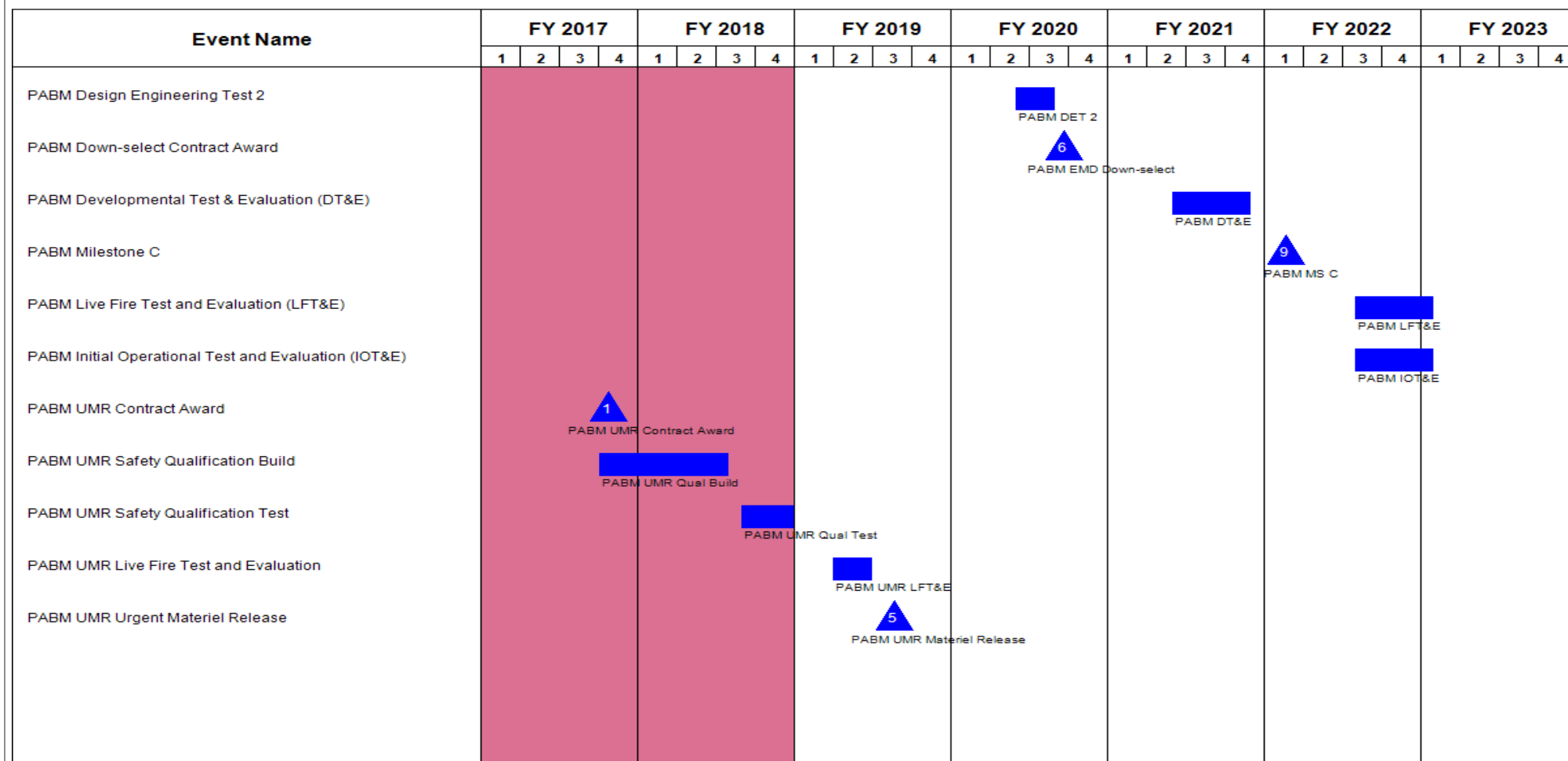
2040 / 5

R-1 Program Element (Number/Name)

PE 0604802A / Weapons and Munitions
Engineering Development

Project (Number/Name)

FA6 / 30mm Lethality



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) FA6 / <i>30mm Lethality</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Release Request for Proposal	1	2018	2	2018
Qualification Contract Award	3	2018	3	2018
Qualification (Non-Airburst Cartridges)	3	2018	4	2021
Design Engineering Test & Design Verification Test anti-personnel	4	2019	2	2021
Milestone C (anti-personnel cartridges)	3	2021	3	2021
Design Engineering Test & Design Verification Test anti-materiel	3	2020	4	2021
Milestone C (anti-materiel cartridges)	1	2022	1	2022
PABM P-Spec Development and Design	1	2018	3	2018
PABM Request for Proposal	4	2018	1	2019
PABM Milestone B	2	2018	2	2018
PABM Engineering & Manufacturing and Development (EMD)	2	2018	1	2022
PABM Development Contract Awards	3	2019	3	2019
PABM Design Engineering Test 1	4	2019	1	2020
PABM Design Engineering Test 2	2	2020	3	2020
PABM Down-select Contract Award	3	2020	3	2020
PABM Developmental Test & Evaluation (DT&E)	2	2021	4	2021
PABM Milestone C	1	2022	1	2022
PABM Live Fire Test and Evaluation (LFT&E)	3	2022	1	2023
PABM Initial Operational Test and Evaluation (IOT&E)	3	2022	1	2023
PABM UMR Contract Award	4	2017	4	2017
PABM UMR Safety Qualification Build	4	2017	3	2018
PABM UMR Safety Qualification Test	3	2018	4	2018

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development		Project (Number/Name) FA6 / 30mm Lethality	
	Start		End	
Events	Quarter	Year	Quarter	Year
PABM UMR Live Fire Test and Evaluation	2	2019	2	2019
PABM UMR Urgent Materiel Release	3	2019	3	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) S36 / Precision Guidance Kit			
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
S36: Precision Guidance Kit	-	15.343	14.809	28.223	-	28.223	30.150	25.695	20.178	17.757	0.000	152.155
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The Precision Guidance Kit (PGK) is a course correcting fuze that provides near 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 effort will incorporate and qualify state of the art technologies to increase the functionality of PGK in GPS degraded environments as well as compatibility with the Army's new long range cannon and projectiles which will be fielded during the PGK Life Cycle.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Contractor Engineering and Manufacturing Development (EMD)								11.744	10.264	24.927	-	24.927
Description: Contractor Engineering and Manufacturing Development (EMD)												
FY 2018 Plans: Design maturation of a modernized PGK and key subsystems.												
FY 2019 Base Plans: Will support sources selection activities to award the Engineering and Manufacturing Development (EMD) contract initiating system design including a Preliminary Design Review (PDR) and prototype development including building and testing prototype hardware for a modernized PGK												
FY 2018 to FY 2019 Increase/Decrease Statement: Increase due to effort transitioning into EMD.												
Title: Government and Engineering Support								3.599	3.705	3.296	-	3.296
Description: Engineering Support												
FY 2018 Plans: Engineering Support of a modernized PGK.												
FY 2019 Base Plans:												

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018	
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) S36 / Precision Guidance Kit			
B. Accomplishments/Planned Programs (\$ in Millions)											
						FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	
Source selection activities to award EMD contract providing engineering support and analysis for the modernization effort.											
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease due to PM Core Labor Support moving to OMA account in FY 2019.											
Title: Continue Development/Operational Testing Description: Development/Operational Test.						-	0.840	-	-	-	
FY 2018 Plans: Execute PGK modernization concept and subsystem maturation. Perform System Design Review as an entry point into Prototype development and testing.											
FY 2018 to FY 2019 Increase/Decrease Statement: Effort complete in FY 2018.											
Accomplishments/Planned Programs Subtotals						15.343	14.809	28.223	-	28.223	
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• E99250: Procurement of Ammunition Army: Precision Guidance Kit (PGK)	118.278	68.363	184.033	63.900	247.933	27.265	57.085	62.120	58.607	Continuing	Continuing
Remarks											
D. Acquisition Strategy The Precision Guidance Kit (PGK) is a Global Positioning System (GPS) guidance kit with fuzing functions for 155mm High Explosive (HE) artillery projectiles. PGK provides near 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 3Q FY 2015, Full Material Release (FMR) was approved 1Q FY 2016, Full Rate Production (FRP) decision and Initial Operational Capability (IOC) occurred 2Q FY 2016. On going PGK Modernization efforts are focused on addressing performance in a GPS degraded environment as well as compatibility with the Army's new long range 155mm cannon and projectile which are scheduled to be fielded in the same timeframe as the next increment of PGK. The strategy includes competitive DoD Ordnance											

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development	Project (Number/Name) S36 / Precision Guidance Kit
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. This will be followed by a competitive FAR Based EMD effort beginning in FY 2019.		
E. Performance Metrics N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) S36 / Precision Guidance Kit					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
PGK TD Contract	C/CPAF	Alliant Techsystems (ATK) : Plymouth, MN	5.279	-		-		-		-		-	0.000	5.279	5.279
PGK TD Contract	C/CPAF	BAE Systems : Minneapolis, MN	3.103	-		-		-		-		-	0.000	3.103	3.103
Soft Recovery Modules	MIPR	SubSystems Technology : Rosslyn, VA	0.116	-		-		-		-		-	0.000	0.116	0.116
PGK EMD & Phase 1-2 (Reliability Failure/Root Cause Analysis)	C/CPAF	Orbital-Alliant Techsystems (O- ATK) : Plymouth, MN	59.953	-		-		-		-		-	0.000	59.953	53.947
PGK EMD - Phase 3a to 5	C/FFP	Orbital-Alliant Techsystems (O- ATK) : Plymouth, MN	32.443	-		-		-		-		-	0.000	32.443	25.117
High Angle Software Configuration	C/CPFF	Raytheon : Ft Wayne, IN	0.105	-		-		-		-		-	0.000	0.105	0.105
Engineering & Technology Assessment. Low Cost Roll Control Solutions	C/CPFF	DoD Ordnance Technology Consortium (DOTC) - General Dynamics Ordnance & Tactical Systems : Bothell, WA	4.774	-		-		-		-		-	0.000	4.774	2.093
Engineering & Technology Assessment. Low Cost Course Correction solutions.	C/CPFF	BAE Systems/ Rokar : Minneapolis, MN	1.778	-		-		-		-		-	0.000	1.778	0.500
DOTC - PGK GPS Anti- Jam Development - Raytheon	MIPR	DoD Ordnance Technology Consortium (DOTC) - Raytheon : Ft Wayne, IN	1.278	2.018	Jul 2017	-		-		-		-	0.000	3.296	-
DOTC - PGK GPS Anti- Jam Development - O-ATK	MIPR	DoD Ordnance Technology Consortium (DOTC)	6.755	1.462	Jul 2017	-		-		-		-	0.000	8.217	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) S36 / Precision Guidance Kit					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
		- Orbital-Alliant Techsystems (O- ATK) : Plymouth, MN													
DOTC - PGK GPS Anti- Jam Development - Rockwell Collins	MIPR	DoD Ordnance Technology Consortium (DOTC) - Rockwell Collins : Cedar Rapids, IA	0.778	0.783	Mar 2017	-		-		-		-	0.000	1.561	-
DOTC - PGK GPS Anti- Jam Development - L3 IEC	MIPR	DOD Ordnance Consortium (DOTC) - L3 - IEC : Various	-	3.341	Apr 2017	-		-		-		-	0.000	3.341	40.025
DOTC - PGK GPS Anti- Jam Development - GD- OTS	MIPR	DoD Ordnance Technology (DOTC) - General Dynamics Ordnance & Tactical Systems : Bothell, WA	-	2.017	Feb 2017	-		-		-		-	0.000	2.017	-
DOTC - PGK GPS Anti- Jam Development - BAE	MIPR	DoD Ordnance Technology (DOTC) - BAE Systems / Rokar : Minneapolis, MN	-	2.017	Feb 2017	-		-		-		-	0.000	2.017	-
DOTC - PGK GPS Anti- Jam Development - BAE / GD-OTS	MIPR	TBD : TBD	-	-		10.264		-		-		-	0.000	10.264	-
EMD Development Contract	MIPR	TBD : TBD	-	-		-		25.689	Mar 2019	-		25.689	0.000	25.689	-
Subtotal			116.362	11.638		10.264		25.689		-		25.689	0.000	163.953	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development						Project (Number/Name) S36 / Precision Guidance Kit			
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Management Office	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	12.797	0.867	Jan 2017	0.867		-		-		-	0.000	14.531	12.764
Government Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	30.727	2.733	Jan 2017	2.733		2.534	Jan 2019	-		2.534	0.000	38.727	31.798
Management Support	MIPR	Camber : Mt Arlington, NJ	1.936	0.105	Jun 2017	0.105		-		-		-	0.000	2.146	1.936
Miscellaneous Support Contract	MIPR	MITRE Corporation : Fort Monmouth, NJ	0.600	-		-		-		-		-	0.000	0.600	-
Jammer Support	MIPR	Electronic Proving Ground (EPG) : Ft Huachuca, AZ	0.316	-		-		-		-		-	0.000	0.316	0.476
PGK Parallel Studies and Analysis Support	MIPR	Command and Control Directorate : Ft Monmouth, NJ	0.300	-		-		-		-		-	0.000	0.300	-
LNO Support - Ft. Sill	MIPR	US ARMY Field Artillery Center : Ft. Sill, OK	0.201	-		-		-		-		-	0.000	0.201	0.180
ATEC Support	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen, MD	0.041	-		-		-		-		-	0.000	0.041	0.025
Subtotal			46.918	3.705		3.705		2.534		-		2.534	0.000	56.862	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) S36 / Precision Guidance Kit					
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
System Development Testing Increment 1	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	10.442	-		-		-		-		-	0.000	10.442	10.442
Other Development Testing	MIPR	Various : Various	1.769	-		-		-		-		-	0.000	1.769	1.769
Limited User Test	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	1.631	-		-		-		-		-	0.000	1.631	1.631
Initial Operational Test & Evaluation - Increment 1	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	1.000	-		-		-		-		-	0.000	1.000	1.000
Initial Operational Test & Evaluation - Troop Support	MIPR	Lab Test Center : Ft. Sill, OK	0.731	-		-		-		-		-	0.000	0.731	0.731
Component Air Gun/ Railgun Testing	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	0.337	-		-		-		-		-	0.000	0.337	0.337
Cold Region Testing	MIPR	Cold Region Test Center : Yuma, AZ	0.300	-		-		-		-		-	0.000	0.300	0.300
Airdrop Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	0.200	-		-		-		-		-	0.000	0.200	0.200

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions Engineering Development				Project (Number/Name) S36 / Precision Guidance Kit					
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Testing for GPS Anti-Jam	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	0.590	-		0.840		-		-		-	0.000	1.430	1.840
Subtotal			17.000	-		0.840		-		-		-	0.000	17.840	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			180.280	15.343		14.809		28.223		-		28.223	0.000	238.655	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>		Project (Number/Name) S36 / <i>Precision Guidance Kit</i>	

Event Name	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023							
	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				
Modernization / Concept Development	[Blue Bar]				[Pink Bar]																											
	Concept Development																															
Modernization / System Functional Review (SFR)																																
Modernization / Concept Maturation																																
Modernization / System Design Review (SDR)																																
Modernization / EMD Source Selection																																
Modernization / EMD Award																																
Modernization / Prototype Development and Testing																																
Modernization / Preliminary Design Review (PDR)																																
Modernization / Critical Design Review (CDR)																																
Modernization / Contractor Verification Testing																																
Modernization / Qualification Testing																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions Engineering Development</i>	Project (Number/Name) S36 / <i>Precision Guidance Kit</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Modernization / Concept Development	1	2017	4	2017
Modernization / System Functional Review (SFR)	4	2017	4	2017
Modernization / Concept Maturation	4	2017	4	2018
Modernization / System Design Review (SDR)	4	2018	4	2018
Modernization / EMD Source Selection	1	2019	2	2019
Modernization / EMD Award	2	2019	2	2019
Modernization / Prototype Development and Testing	3	2019	4	2020
Modernization / Preliminary Design Review (PDR)	4	2019	4	2019
Modernization / Critical Design Review (CDR)	1	2021	1	2021
Modernization / Contractor Verification Testing	1	2021	4	2021
Modernization / Qualification Testing	1	2022	1	2024
Initial Operation Test and Evaluation (IOT&E) - Modernization	4	2024	4	2024