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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 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced 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	-	47.745	41.452	41.974	-	41.974	43.272	24.428	21.910	24.502	Continuing	Continuing
694: Medium Caliber Ammunition	-	10.087	1.000	1.484	-	1.484	0.989	0.000	0.000	0.000	0.000	13.560
EB8: OWL for Small Caliber Ammunition	-	2.275	1.200	2.177	-	2.177	1.977	0.000	0.000	0.000	0.000	7.629
EB9: Aviation Airborne Expandable Countermeasures	-	3.469	1.000	2.474	-	2.474	1.186	0.000	0.000	0.000	0.000	8.129
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	0.000	0.000	3.760	-	3.760	6.821	0.000	0.000	0.000	0.000	10.581
EC3: Ammunition Logistics Prototyping	-	1.940	1.677	1.315	-	1.315	1.507	1.695	2.145	1.778	0.000	12.057
EL7: Reduced Range Ammunition	-	1.314	7.600	7.618	-	7.618	0.000	0.000	0.000	0.000	0.000	16.532
EL8: LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER	-	1.807	2.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.307
EU1: Enhanced Lethality Cannon Munitions	-	9.486	10.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.486
EU2: Improved Multi-Option Fuze (iMOFA/iMOFM)	-	7.588	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.588
EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)*	-	0.000	0.000	0.000	-	0.000	4.201	0.000	0.000	0.000	0.000	4.201
FA5: Assured Precision Weapons and Munitions	-	9.779	13.000	14.340	-	14.340	11.862	7.907	0.000	0.000	0.000	56.888
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.000	1.000	4.947	-	4.947	8.897	14.826	19.765	22.724	Continuing	Continuing
XT5: 30mm Anti-Personnel and Counter UAS	-	0.000	2.475	3.859	-	3.859	5.832	0.000	0.000	0.000	0.000	12.166
*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2019												

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<div>Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</div> <div>R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development</div>		
<div>A. Mission Description and Budget Item Justification</div> <div>The Tank and Medium Caliber Ammunition Program Element (PE) encompasses a comprehensive program to develop, rapidly transition to production, and field advanced weapons and munitions. These projects will ensure continued battlefield overmatch and lethality of U.S. maneuver forces against the full range of modern battlefield threats. To achieve this, the Tank and Medium Caliber Ammunition Program will identify and develop promising technologies through competitive development and streamlined acquisition procedures.</div> <div>Project 694: 30x113mm Linked Ammunition: Develop and qualify 30x113mm linked ammunition for ground vehicles by increasing precision and lethality capability to defeat personnel and materiel targets as well as the Joint Urgent Operational Need to counter the rapidly evolving threat of Unmanned Aerial Systems. This effort will qualify the links for use in existing M788 and M789 ammunition and develop airburst capable munitions fired from the Lightweight 30x113mm Link Fed Chain Gun. FY 2019 funds will be used to purchase links and linked ammunition, conduct weapon system integration, testing and evaluation, and support the Urgent Materiel Release (UMR) of the 30x113mm weapon system.</div> <div>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 Launchers. 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.</div> <div>The 30x173mm Programmable Airburst Munitions - Tracer (PABM-T) Urgent Materiel Release (UMR) program funds the qualification and procurement of a PABM-T cartridge for rapid fielding in support of the Stryker Operational Needs Statement (ONS) for Increased Lethality. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV). The cartridge will provide an airburst capability with increased effectiveness against personnel in the open and in defilade over the current tactical solutions.</div> <div>Project EB8: 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. The OWL project's objective is to develop and field a full day/night tracer round to 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 and .50 caliber cartridges. FY 2019 funding supports continued testing and evaluation of the 5.56mm prototype solutions in order to attain a Technology Level Readiness (TRL) of 6 in FY 2020.</div> <div>Project EB9: This project is to support the advanced development activities and technology demonstrations of the Aviation Airborne Expendable Countermeasure (AAECM). These advanced decoys are necessary to address emerging threats and capabilities deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. These efforts will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will help expedite technology transition from the laboratory</div>		

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>
<p>to operational use by demonstrating component and subsystem maturity prior to integration into major and complex Army aircraft platforms. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army RDT&E efforts are coordinated with the PEO Aviation and its platform PMs with PM Aircraft Survivability Equipment (ASE) to address emerging Joint Urgent Operational Needs Statement (JUONS) from theatre. Continue to develop and prepare documentation for Milestone A decision for the Radar Guided decoy. This decoy is designed to defeat specific threat types. Details of their operation is classified. Conduct initial developmental/operational testing on Cloud CM.</p> <p>Project EC2: The Advanced Armor-Piercing (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 FY 2019 funding focuses on calibers below 7.62mm. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. This project is a New Start FY 2019.</p> <p>Project EC3: 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 complete verification testing and an operational demonstration for the environmental health monitoring system. FY 2019 funding will also continue verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability, and continue the maturation of the design and fabrication of prototype plastic polymer rectangular containers for developmental 5.56mm ammunition.</p> <p>Project EL7: 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. Funding will also explore lessons learned from the United States Marine Corp (USMC) .50 Caliber Reduced Range Ammunition effort and other various options to satisfy the .50 Caliber reduced range requirement.</p> <p>Project EL8: The Lightweight Small Caliber Ammunition (LSCA) Project is a critical technology development in response to the 7.62mm Capabilities Development Documents (CDD). The goal of the LSCA Project is to reduce the total Soldier load through reduction in ammunition weight. The LSCA Project will develop and field 7.62mm LSCA cartridges that will provide the same capabilities as the M80A1 and M62A1 cartridges. The LSCA cartridge will be designed to be compatible with all Army 7.62mm weapon systems, but optimized to work in the M240 Machine Gun.</p>		

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>
<p>Project EU1: The Enhanced Lethality Cannon Munitions (ELCM) project evaluates, develops, matures, and demonstrates new lethality technologies for 155mm cannon artillery munitions and evaluates their effectiveness in mitigating evolving and derived capability gaps, and support transition to Engineering Manufacturing Development (EMD). The ELCM project prototypes and accelerates the maturation of enhanced lethality technologies, such as Lithographic Fragmentation Technology (LFT) or pre-formed fragmentation, for 155mm cannon artillery munitions. The ELCM project accelerates the development and maturation of LFT for subsequent integration 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. ELCM also supports prototyping of enhanced lethality technologies applicable to 155mm cannon artillery munitions, including prototyping of projectile design, explosive formulations, fragmentation, and software for the 155mm XM1113 effort, which is a potential long-range cannon projectile that will increase range by 10km or greater and contain twice as much rocket motor grains as the current 155mm long range cannon projectile that is now obsolete. The design requires increased lethality since the projectile contains a reduced amount of explosive to make room for the increased amount of rocket motor grains required for increased range. ELCM addresses requirements for increased lethality above the current U.S. Army go-to-war 155mm high explosive unitary projectiles, the M795 Insensitive Munition and obsolete M549A1 Unitary Munition.</p> <p>Project EU2: The Improved Multi-Option Fuze (iMOFA/iMOFM) project will identify, develop, prototype, and demonstrate new improved multi-option fuze technologies, components, and subsystems based on Government-owned Next Generation Proximity Sensor (NGPS) capabilities with 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. This project will support technology maturation and risk reduction, and will evaluate and analyze producibility, affordability, safety, and compatibility of these prototype potential materiel solutions in representative realistic performance-related developmental tests. This project will enable fact-based analysis of new Government-owned height of burst/proximity fuzing alternatives that are resistant to enemy countermeasures and reverse engineering threats, quantify their effectiveness, reduce integration risk, and support transition into existing/new artillery/mortar fuzes and munitions.</p> <p>Project FA5: The Assured Precision Weapons and Munitions (APWM) project is a continuation of efforts initiated under 644120A-ED5. The objective of this advanced risk mitigation, prototyping and product support effort is to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems in a system of systems environment. The APWM efforts directly support three of the Chief of Staff of the Army's (CSA) "Big 6" Modernization Priorities. Specifically, they support; Long Range Precision Fires, Network/C3I (incl Assured PNT), and Soldier Lethality. The APWM project will enable increased lethality and ensure future battlefield success against peer/near-peer adversaries by supporting these Modernization Priorities. Current and evolving threats to existing Positioning, Navigation, and Timing (PNT) capabilities have created the need for new/emerging Assured PNT capabilities (including M-Code GPS and Pseudolites) into both Munitions and Weapons operating in a complex system-of-systems environment. This imperative is reinforced by Public Law 111-383 Section 913 which mandates the use of Air Force-developed M-Code GPS capabilities in all systems fielded FY2018 and beyond unless a waiver is obtained from the Secretary of Defense. As such, both precision weapon and munition programs must coordinate with the development and technology delivery activities of the Air Force's Military GPS User Equipment (MGUE) program and the Army's Assured PNT program to protect and insure critical precision-based Joint warfighting capabilities as well as maximizing effectiveness and efficiency of US taxpayer investments. FY 2019 funding will support the development and technology delivery activities of the Air Force's MGUE program and the Army's Assured PNT program including participation in design reviews, evaluation and formal feedback on systems requirements and technology performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment,</p>		

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configuration management of the evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions, and specific support focus includes requirements for MGUE Increment 2, Pseudolites (PL), and Alternative Navigation (AltNav) related technology maturity for Assured PNT milestone decisions.						
<p>Project FG1: The Cannon-Delivered Area Effects Munitions (C-DAEM) Project will analyze, identify, develop, prototype, and demonstrate 155mm Cannon Artillery munition area effects capability. C-DAEM are envisioned as a suite of 155mm artillery munitions, to provide U.S. ground forces with a capability to effectively engage area targets to destroy, neutralize and/or suppress threat platforms and facilities, and deny threat forces full operational freedom within the targeted area. Initial objective values for C-DAEM would meet Dual Purpose Improved Conventional Munition (DPICM) effects capabilities against personnel and light vehicles and exceed DPICM effects capabilities against armor. An Analysis of Alternatives (AoA) will be completed to best inform necessary area effect lethality requirements. The Project addresses requirements from the U.S. Army adopted U.S. Marine Corps (USMC) C-DAEM Initial Capabilities Document (ICD) [Army Requirements Oversight Council (AROC) adopted 20 October 2016, Joint Requirements Oversight Council (JROC) approved 11 May 2016]. The approved C-DAEM ICD as an Army requirement is located in the Capabilities and Army Requirements Documents number 0438. The Joint Staffing Designator is JROC Interest. FY 2019 will support the preparation and evaluation of the Request for Proposals (RFP) for technologies and capabilities identified through the AoA, as well as the development of the Capabilities Development Document (CDD) for each technology.</p> <p>Project XT5: Lightweight 30mmx113mm (LW30) Airburst is a new capability identified as a Warfighter requirement in the Capability Production Document (CPD), AH-64E Helicopter, Increment 1, Version 6. The LW30 airburst cartridge improves the ability of the warfighter to effectively engage anti-personnel/materiel targets due to increased lethality. Airburst capability provides the user a much higher probability of achieving a first burst kill against enemy personnel targets in the open. The LW30 will retain its dual purpose warhead, allowing it to continue to defeat light armored threats through point detonation. The cartridge provides increased lethal effects against personnel & soft-skin vehicular targets increasing Soldier Survivability on the ground during troops in contact engagements and decreases the required number of rounds to reach the desired lethal effects. FY 2019 continues to support the Technology Maturation and Risk Reduction effort.</p>						
B. Program Change Summary (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget		42.096	41.452	42.209	-	42.209
Current President's Budget		47.745	41.452	41.974	-	41.974
Total Adjustments		5.649	0.000	-0.235	-	-0.235
• Congressional General Reductions		-	-			
• Congressional Directed Reductions		-	-			
• Congressional Rescissions		-	-			
• Congressional Adds		8.000	-			
• Congressional Directed Transfers		-	-			
• Reprogrammings		-	-			
• SBIR/STTR Transfer		-2.351	-			
• Adjustments to Budget Years		-	-	-0.235	-	-0.235

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Congressional Add Details (\$ in Millions, and Includes General Reductions)		FY 2017	FY 2018
Project: 694: <i>Medium Caliber Ammunition</i>			
Congressional Add: <i>Safety Confirmation and Qualification in support of Stryker ICV Urgent Material Release (UMR)</i>		8.000	-
Congressional Add Subtotals for Project: 694		8.000	-
Congressional Add Totals for all Projects		8.000	-

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Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) 694 / Medium Caliber 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
694: Medium Caliber Ammunition	-	10.087	1.000	1.484	-	1.484	0.989	0.000	0.000	0.000	0.000	13.560
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note Program Element (PE) 0603639A, Project 694, Medium Caliber Ammunition funds the 40mm Low Velocity High Explosive Air Burst (HEAB) XM1166, 30mm Stryker Infantry Carrier Vehicle (ICV) Lethality efforts in FY 2017, and the 30x113mm ammunition improvements for ground vehicle platform efforts beginning in FY 2018. In FY 2018, PE 0603639A, Project 694, HEAB XM1166 will transition to Budget Activity 5 (BA5) PE 0604802A, Project EW1, 40mm Low Velocity Ammunition.												
A. Mission Description and Budget Item Justification 30x113mm Linked Ammunition: Develop and qualify 30x113mm linked ammunition for ground vehicles by increasing precision and lethality capability to defeat personnel and materiel targets as well as the Joint Urgent Operational Need to counter the rapidly evolving threat of Unmanned Aerial Systems. This effort will qualify the links for use in existing M788 and M789 ammunition and develop airburst capable munitions fired from the Lightweight 30x113mm Link Fed Chain Gun. FY 2019 funds will be used to purchase links and linked ammunition, conduct weapon system integration, testing and evaluation, and support the Urgent Materiel Release (UMR) of the 30x113mm weapon system. 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 Launchers. 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. The 30x173mm Programmable Airburst Munitions - Tracer (PABM-T) Urgent Materiel Release (UMR) program funds the qualification and procurement of a PABM-T cartridge for rapid fielding in support of the Stryker Operational Needs Statement (ONS) for Increased Lethality. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV). The cartridge will provide an airburst capability with increased effectiveness against personnel in the open and in defilade over the current tactical solutions.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2017	FY 2018	FY 2019	
Title: Linked 30x113mm Ammunition Qualification for New Weapon and Vehicle Applications									-	1.000	1.484	
Description: Linked 30x113mm Ammunition Qualification for New Weapon and Vehicle Applications												
FY 2018 Plans:												

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Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>			Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>				
B. Accomplishments/Planned Programs (\$ in Millions)											
FY 2018 funds are required to update linked 30x113mm ammunition Technical Data Packages (TDPs), purchase ammunition links, and contract to link M788 and M789 cartridges. Linked ammunition deliveries will be synchronized to support ammunition/link/weapon qualification activities. FY 2019 Plans: FY 2019 funds will be used to purchase links and linked ammunition, conduct weapon system integration, testing and evaluation, and support the Urgent Materiel Release (UMR) of the 30x113mm weapon system. FY 2018 to FY 2019 Increase/Decrease Statement: FY 2018 new start for 30x113mm linked ammunition. FY 2019 planned continuation technology maturation of the 30x113mm linked ammunition and support UMR. Title: Pre Engineering Manufacturing Development Activities for the 40mm HEAB XM1166 Description: Pre-award activities need to be accomplished prior to start of EMD.							FY 2017	FY 2018	FY 2019		
							2.087	-	-		
							Accomplishments/Planned Programs Subtotals	2.087	1.000	1.484	
							FY 2017	FY 2018			
Congressional Add: Safety Confirmation and Qualification in support of Stryker ICV Urgent Material Release (UMR) FY 2017 Accomplishments: N/A							8.000	-			
Congressional Adds Subtotals							8.000	-			
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
• FA6: 30mm Lethality	-	12.000	13.851	-	13.851	8.897	11.860	6.918	-	Continuing	Continuing
• EW1: 40mm Low Velocity Ammunition	-	9.678	13.269	-	13.269	14.032	21.302	1.482	-	0.000	59.763
Remarks 40mm High Explosive Air Burst (HEAB), XM1166, effort transitions to Program Element (PE) 0604802A, Project EW1, in FY 2018. The Stryker 30mm Programmable Airburst Munitions lethality effort transitions from PE 0603639A, Project 694, to PE0604802A, Project FA6, in FY 2018.											

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<p><u>D. Acquisition Strategy</u></p> <p>30x113mm Linked Ammunition: An existing Indefinite Delivery/Indefinite Quantity (IDIQ) contract will be used to purchase links for the 30x113mm ammunition. Linked ammunition deliveries will be synchronized with test schedules for ammunition/weapon qualification and Remote Weapon Station (RWS)/vehicle system integration. Ammunition qualification tests and weapon qualification tests will begin in FY 2019. Purchase of linked M788 and M789 cartridges will transition to competitive procurement by FY 2021. Preparatory activities for initial efforts to develop an airburst capable munition will also be conducted.</p> <p>40mm Low Velocity High Explosive Airburst (HEAB): 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, two Full and Open competitive contracts will be awarded. 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>Stryker 30x173mm Programmable Airburst Munitions-Tracer (PABM-T): A contract will be awarded to purchase MK310 MOD 0 PABM-T (Programmable Air Burst with Tracer) cartridges in support of Safety Confirmation Testing. A follow on production contract will be awarded for rapid fielding in support of the Urgent Materiel Release (UMR).</p> <p><u>E. Performance Metrics</u></p> <p>N/A</p>		

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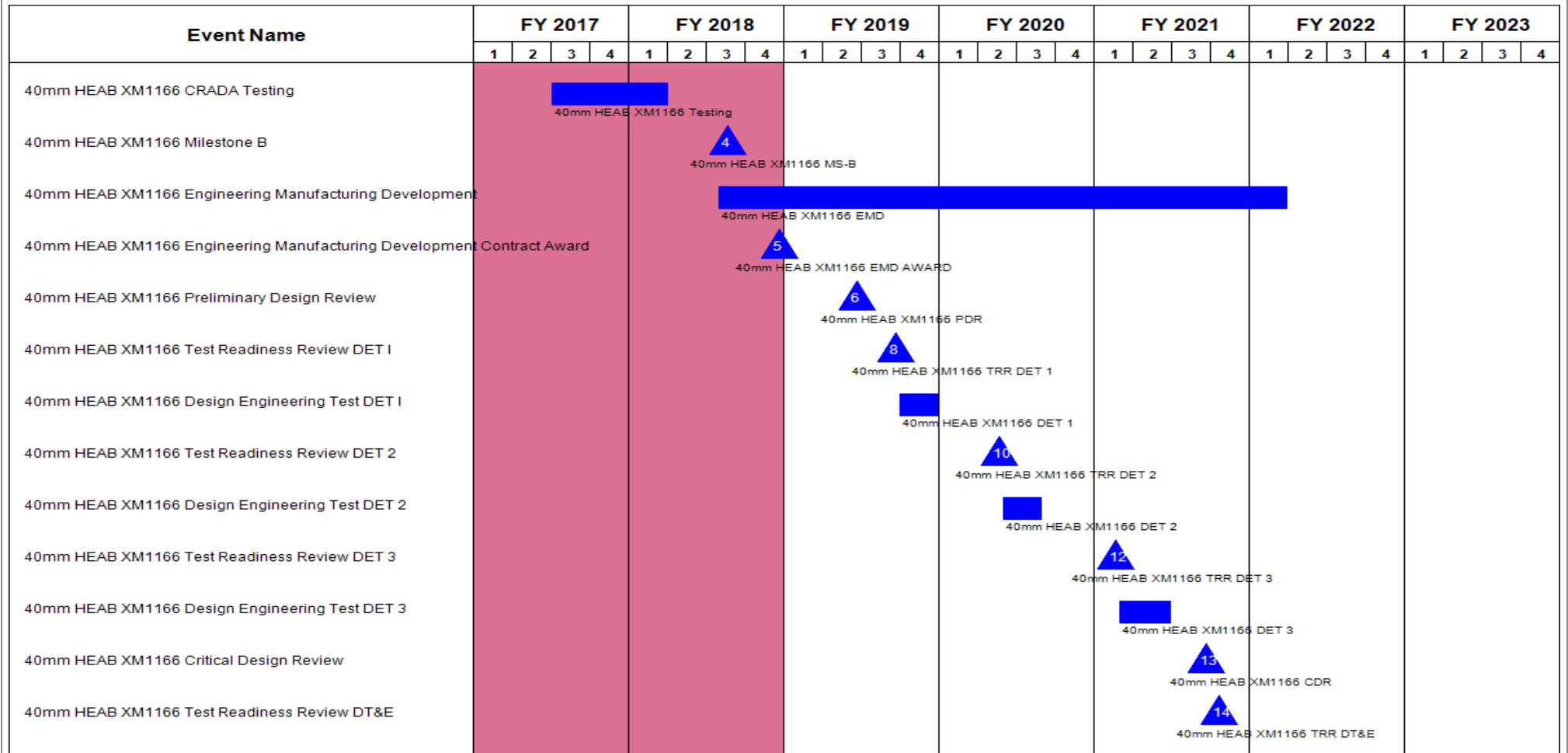
Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) 694 / Medium Caliber Ammunition					
Product Development (\$ 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
40mm High Explosive Air Burst XM1166 Program Manager Maneuver Ammunition Systems (PM MAS)	MIPR	Picatinny Arsenal, NJ : Picatinny Arsenal, NJ	-	0.200		-		-		-		-	Continuing	Continuing	Continuing
30x173mm Stryker Ammo Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal, NJ : Picatinny Arsenal, NJ	-	0.100		-		-		-		-	0.000	0.100	-
30x113 Ammo Links and Linking Contract	Option/ IDIQ	TBD : TBD	-	-		0.600		1.084		-		1.084	Continuing	Continuing	Continuing
30x173mm Stryker Ammo Contract	Option/ FFP	Orbital ATK : Plymouth, MN	-	7.500		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			-	7.800		0.600		1.084		-		1.084	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
40mm HEAB XM1166 Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	-	1.377		-		-		-		-	Continuing	Continuing	Continuing
30x113 Linked Ammo Armament Research Development and Engineering Center (ARDEC)	MIPR	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	-	-		0.400		0.400		-		0.400	Continuing	Continuing	Continuing
30X173mm Stryker Ammo Armament Research Development and Engineering Center (ARDEC)	MIPR	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	-	0.400		-		-		-		-	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>			
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
40mm HEAB Communications-Electronics Research Development and Engineering Center (CERDEC)	MIPR	Communications-Electronics Research Development and Engineering Center (CERDEC) : Aberdeen Proving Grounds, MD	-	0.148		-		-		-		-	0.000	0.148	-
40mm HEAB Army Materiel Systems Analysis Activity (AMSAA)	MIPR	Army Materiel Systems Analysis Activity (AMSAA) : Aberdeen Proving Grounds, MD	-	0.080		-		-		-		-	0.000	0.080	-
Subtotal			-	2.005		0.400		0.400		-		0.400	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
40mm HEAB XM1166 Aberdeen Test Center (ATC) - CRADA	MIPR	ATC : Aberdeen, MD	-	0.282		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			-	0.282		-		-		-		-	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			-	10.087		1.000		1.484		-		1.484	Continuing	Continuing	N/A
Remarks															

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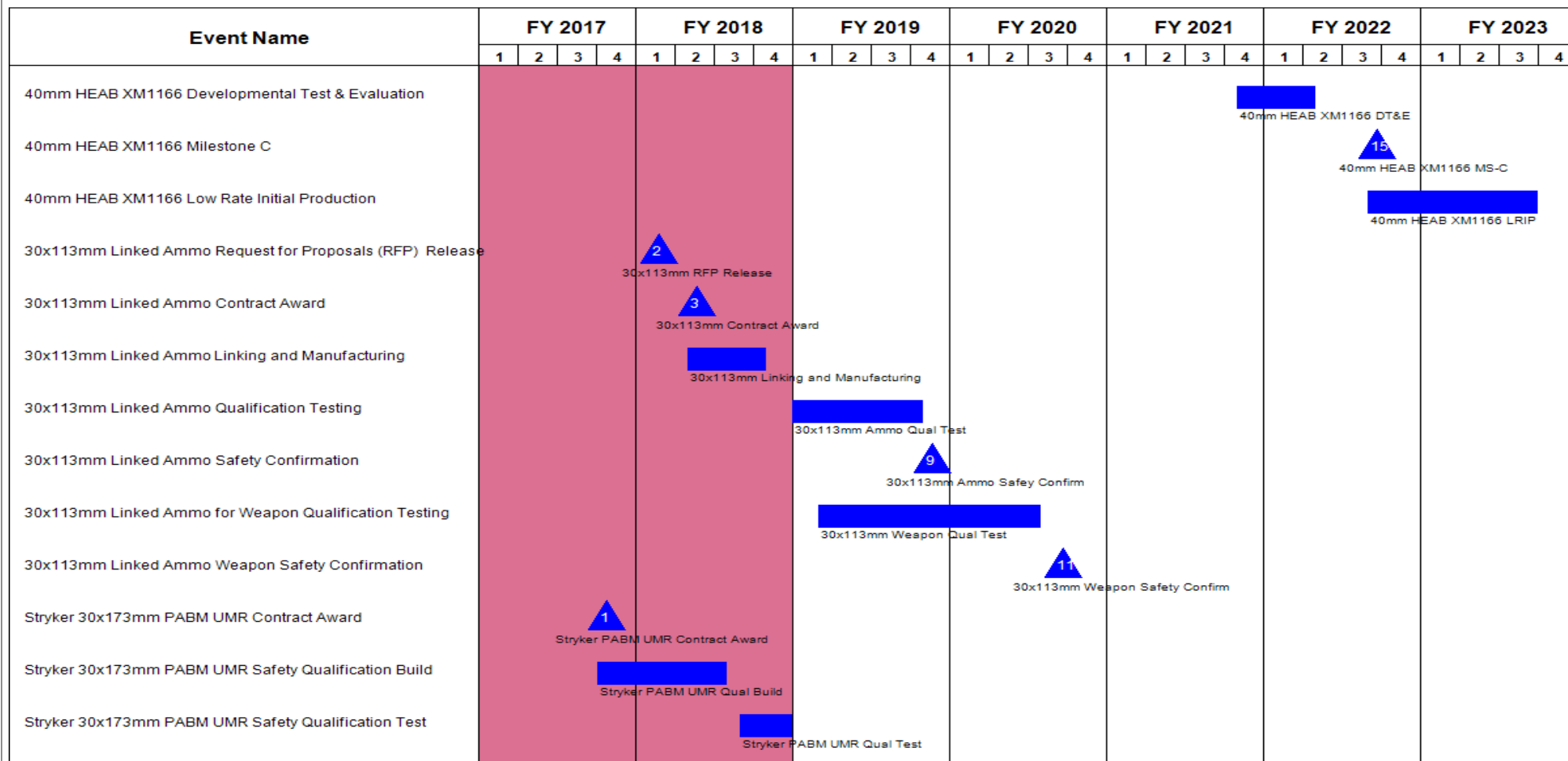
Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development		Project (Number/Name) 694 / Medium Caliber Ammunition	



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) 694 / <i>Medium Caliber Ammunition</i>
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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army																Date: February 2018																					
Appropriation/Budget Activity 2040 / 4										R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development								Project (Number/Name) 694 / Medium Caliber 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
Stryker 30x173mm PABM UMR Live Fire Test and Evaluation														<div><div></div><div>Stryker PABM UMR LFT&E</div></div>																							
Stryker 30x173mm PABM UMR Urgent Materiel Release																																					
														<div><div>7</div><div>Stryker PABM UMR Materiel Release</div></div>																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) 694 / <i>Medium Caliber 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 Engineering Manufacturing Development Contract Award	4	2018	4	2018
40mm HEAB XM1166 Preliminary Design Review	2	2019	2	2019
40mm HEAB XM1166 Test Readiness Review DET I	3	2019	3	2019
40mm HEAB XM1166 Design Engineering Test DET I	4	2019	4	2019
40mm HEAB XM1166 Test Readiness Review DET 2	2	2020	2	2020
40mm HEAB XM1166 Design Engineering Test DET 2	2	2020	3	2020
40mm HEAB XM1166 Test Readiness Review DET 3	1	2021	1	2021
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 Test Readiness Review DT&E	4	2021	4	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
30x113mm Linked Ammo Request for Proposals (RFP) Release	1	2018	1	2018
30x113mm Linked Ammo Contract Award	2	2018	2	2018
30x113mm Linked Ammo Linking and Manufacturing	2	2018	4	2018
30x113mm Linked Ammo Qualification Testing	1	2019	4	2019
30x113mm Linked Ammo Safety Confirmation	4	2019	4	2019
30x113mm Linked Ammo for Weapon Qualification Testing	1	2019	3	2020

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development		Project (Number/Name) 694 / Medium Caliber Ammunition	
	Start		End	
Events	Quarter	Year	Quarter	Year
30x113mm Linked Ammo Weapon Safety Confirmation	3	2020	3	2020
Stryker 30x173mm PABM UMR Contract Award	4	2017	4	2017
Stryker 30x173mm PABM UMR Safety Qualification Build	4	2017	3	2018
Stryker 30x173mm PABM UMR Safety Qualification Test	3	2018	4	2018
Stryker 30x173mm PABM UMR Live Fire Test and Evaluation	2	2019	2	2019
Stryker 30x173mm 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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EB8 / OWL for Small Caliber 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
EB8: OWL for Small Caliber Ammunition	-	2.275	1.200	2.177	-	2.177	1.977	0.000	0.000	0.000	0.000	7.629
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber One Way Luminescence (OWL) technology applies to multiple calibers. In FY 2018, Program Element (PE) 0603639A, Project EB8, 7.62mm OWL will transition to Budget Activity 5 (BA5) PE 0604802A, Project EP4, 7.62mm OWL; 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/ Project 0604802A EP4 starting 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.

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. The OWL project's objective is to develop and field a full day/night tracer round to 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 and .50 caliber cartridges. FY 2019 funding supports continued testing and evaluation of the 5.56mm prototype solutions in order to attain a Technology Level Readiness (TRL) of 6 in FY 2020.

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

	FY 2017	FY 2018	FY 2019
Title: Technology Maturation and Risk Reduction (TMRR)	2.275	1.200	2.177
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: The 7.62mm efforts include maturing the multiple design concepts and Technology Readiness Level (TRL) to TRL 6. The 7.62mm effort will down-select to one design from multiple competing prototype solutions to begin EMD. FY 2018 efforts include activities to mature 5.56mm TRL and includes development, procurement, and testing of multiple competing prototype solutions to reduce risk in meeting user requirements. Funding also supports the exploration of .50 caliber technology.			
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army							Date: February 2018				
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>			Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</i>				
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2017	FY 2018	FY 2019		
FY 2019 efforts will continue activities to mature 5.56mm Technology Readiness Level (TRL). The 5.56mm efforts include development, procurement, and testing of multiple competing prototype solutions to reduce risk in meeting user requirements. Funding will also support the exploration of .50 caliber technology.											
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Technology maturation of the 5.56mm OWL starts in FY 2018. The FY 2019 funding furthers the development of the 5.56mm OWL technology.											
Accomplishments/Planned Programs Subtotals							2.275	1.200	2.177		
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
• EP4: <i>One-Way Luminescence for Small Caliber Ammo</i>	-	2.688	6.085	-	6.085	6.472	12.247	5.324	6.422	0.000	39.238
Remarks The OWL technology will be integrated into the M80A1 trace ammunition production. Budget Activity (BA5) Program Element (PE) 0604802A, Project EP4, OWL for Small Caliber Ammunition project is not a new start and the FY 2019 funding continues the development work of 7.62mm OWL cartridges into Engineering and Manufacturing Development (EMD). EMD activities in support of the 5.56mm cartridges begin in FY 2021.											
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) in FY 2018. 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 5.56mm tracer cartridges will replace the legacy 5.56mm M856A1 tracer.											
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 / 4						R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EB8 / OWL for Small Caliber 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
Program Manager Maneuver Ammunition Systems (PM MAS) - Labor & Travel	Various	Picatinny Arsenal : New Jersey	0.360	0.010		0.200		0.025		-		0.025	Continuing	Continuing	Continuing
Physical Optics Corporation	C/FFP	Torrance : California	1.005	0.075		-		-		-		-	0.000	1.080	-
Battelle Memorial Institute	C/FFP	Columbus : Ohio	0.611	0.105		-		-		-		-	0.000	0.716	-
Tooling	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.209		-		0.477		-		0.477	0.000	0.686	-
Subtotal			1.976	0.399		0.200		0.502		-		0.502	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	1.719	1.550		1.000		1.350		-		1.350	Continuing	Continuing	Continuing
Subtotal			1.719	1.550		1.000		1.350		-		1.350	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
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	0.200	0.078		-		0.040		-		0.040	Continuing	Continuing	Continuing
Army Corps of Engineers	MIPR	Vicksburg : Missouri	0.260	0.053		-		0.110		-		0.110	Continuing	Continuing	Continuing
Night Vision Labs (NVL)	MIPR	Fort Belvoir : Virginia	0.040	-		-		0.075		-		0.075	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018		
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EB8 / OWL for Small Caliber Ammunition				

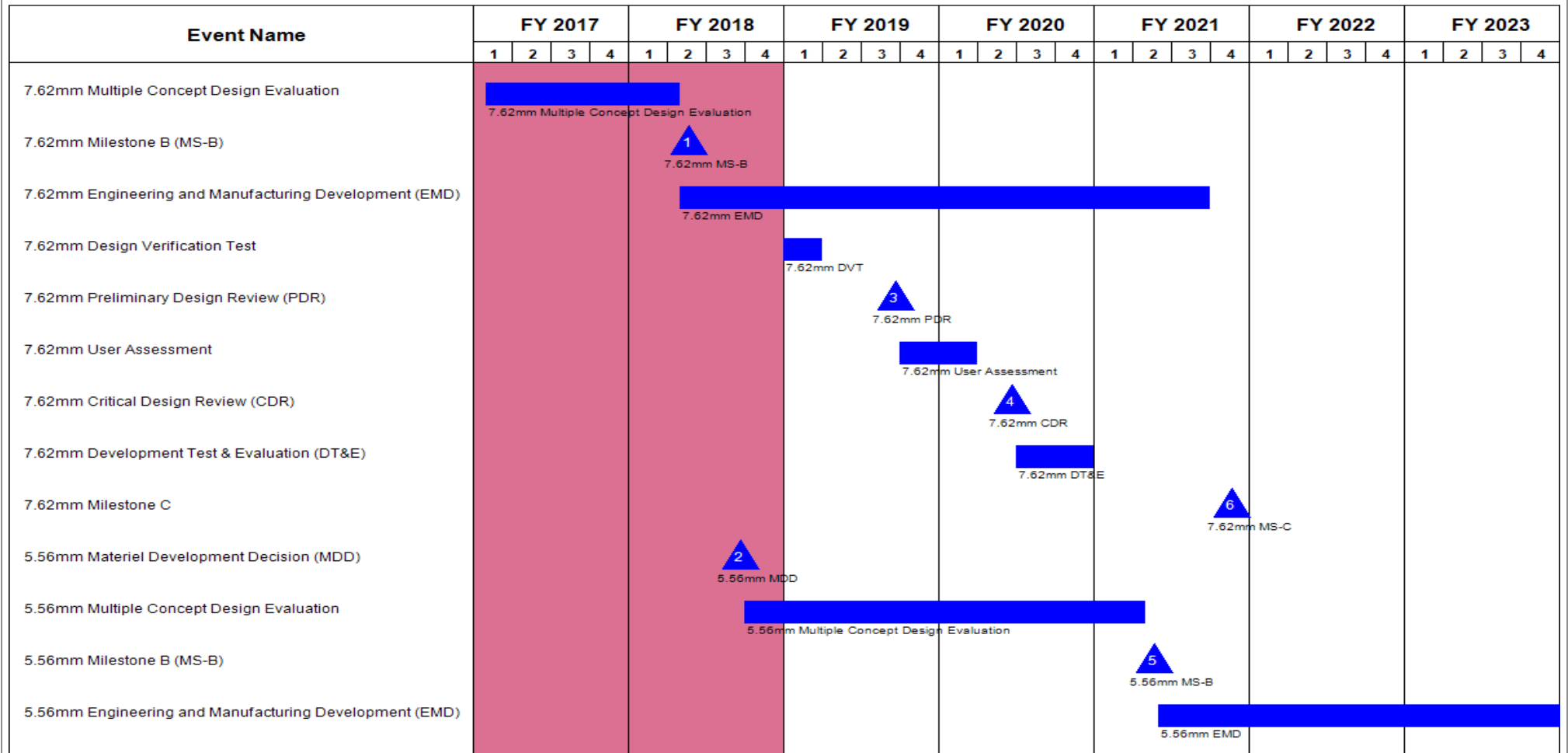
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
US Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	-	0.101		-		0.100		-		0.100	Continuing	Continuing	Continuing
Army Joint Munitions Command	MIPR	Rock Island : Illinois	0.060	0.094		-		-		-		-	0.000	0.154	-
Naval Air Warfare Center	MIPR	Patuxent River : Maryland	0.137	-		-		-		-		-	0.000	0.137	-
Subtotal			0.697	0.326		-		0.325		-		0.325	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		4.392	2.275		1.200		2.177		-	2.177	Continuing	Continuing	N/A

Remarks

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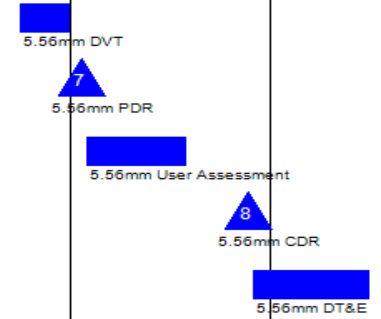
Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>		Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</i>	



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>		Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</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
5.56mm Design Verification Test																												
5.56mm Preliminary Design Review (PDR)																												
5.56mm User Assessment																												
5.56mm Critical Design Review (CDR)																												
5.56mm Development Test & Evaluation (DT&E)																												



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB8 / <i>OWL for Small Caliber Ammunition</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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EB9 / 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
EB9: Aviation Airborne Expandable Countermeasures	-	3.469	1.000	2.474	-	2.474	1.186	0.000	0.000	0.000	0.000	8.129
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project is to support the advanced development activities and technology demonstrations of the Aviation Airborne Expendable Countermeasure (AAECM). These advanced decoys are necessary to address emerging threats and capabilities deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. These efforts will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will help expedite technology transition from the laboratory to operational use by demonstrating component and subsystem maturity prior to integration into major and complex Army aircraft platforms. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army RDT&E efforts are coordinated with the PEO Aviation and its platform Program Managers (PMs) with PM Aircraft Survivability Equipment (ASE) to address emerging Joint Urgent Operational Needs Statement (JUONS) from theatre. Continue to develop and prepare documentation for Milestone A decision for the Radar Guided decoy. This decoy is designed to defeat specific threat types. Details of their operation is classified. Conduct initial developmental/operational testing on Cloud Countermeasures (CM).

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

	FY 2017	FY 2018	FY 2019
Title: Expendable Countermeasures to Guided Missile Threats	3.469	1.000	2.474
Description: This program will develop expendable countermeasure (CM) decoys which will protect Army aircraft from surface-to-air missiles.			
FY 2018 Plans: Develop and prepare documentation for Milestone A decision for the Radar Guided decoy. This decoy is designed to defeat specific threat types. Details of their operation is classified. Initiate contract documents to support post MS A contracts for Radar Guided decoy. Execute Technology Development phase for Cloud CM. Award multiple contracts to support initial developmental/operational testing on Cloud CM.			
FY 2019 Plans: Conduct Cloud Pre-EMD Review, Preliminary Design Review (PDR) and flight testing on Cloud Countermeasures (CM) and Radio Frequency (RF) CM. Initiate documentation to support MS B for Cloud CM. Execute Technology Development phase for Radar CM. Award contract(s) to support initial developmental/operational testing on Radar Guided decoy. Conduct Systems Requirements Review on Radar CM.			
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 / 4			R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development			Project (Number/Name) EB9 / Aviation Airborne Expandable Countermeasures					
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2017	FY 2018	FY 2019		
FY19 funding increased by \$1,474k for additional product development efforts.											
Accomplishments/Planned Programs Subtotals							3.469	1.000	2.474		
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
• EP7: EP7 - Tunable Pyrotechnic Aircraft Countermeasure Flares	1.430	7.500	7.300	-	7.300	5.800	-	16.400	-	0.000	38.430
Remarks											
D. Acquisition Strategy											
The Acquisition strategy is for a family of countermeasure flares that will be developed in incremental phases as funding and requirements are approved. Initial countermeasure flare is the Cloud CM followed by new increments that will defeat threats outlined in the requirements documents developed by TRADOC. MDD approval was in 3QFY17											
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 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) EB9 / <i>Aviation Airborne Expandable Countermeasures</i>			
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	0.340	0.115	Dec 2017	0.110	Aug 2018	0.074	Jan 2019	-		0.074	0.000	0.639	-
Subtotal			0.340	0.115		0.110		0.074		-		0.074	0.000	0.639	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
Prototype Development	C/FFP	ACC : Picatinny Arsenal	0.546	1.500	Dec 2017	-		1.500	May 2019	-		1.500	0.000	3.546	-
Subtotal			0.546	1.500		-		1.500		-		1.500	0.000	3.546	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	1.126	0.593		0.250	Jan 2018	0.400	Jan 2019	-		0.400	0.000	2.369	-
Subtotal			1.126	0.593		0.250		0.400		-		0.400	0.000	2.369	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	AED : Redstone Arsenal	0.500	0.450		0.125	Apr 2018	0.500	Apr 2019	-		0.500	0.000	1.575	-
Modeling & Simulation	MIPR	AMRDEC/ARDEC : Picatinny Arsenal	-	-		0.515	Apr 2018	-		-		-	0.000	0.515	-
AOA Development	MIPR	AMSAA : APG, MD	-	0.261	Aug 2017	-		-		-		-	0.000	0.261	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>				Project (Number/Name) EB9 / <i>Aviation Airborne Expandable Countermeasures</i>					

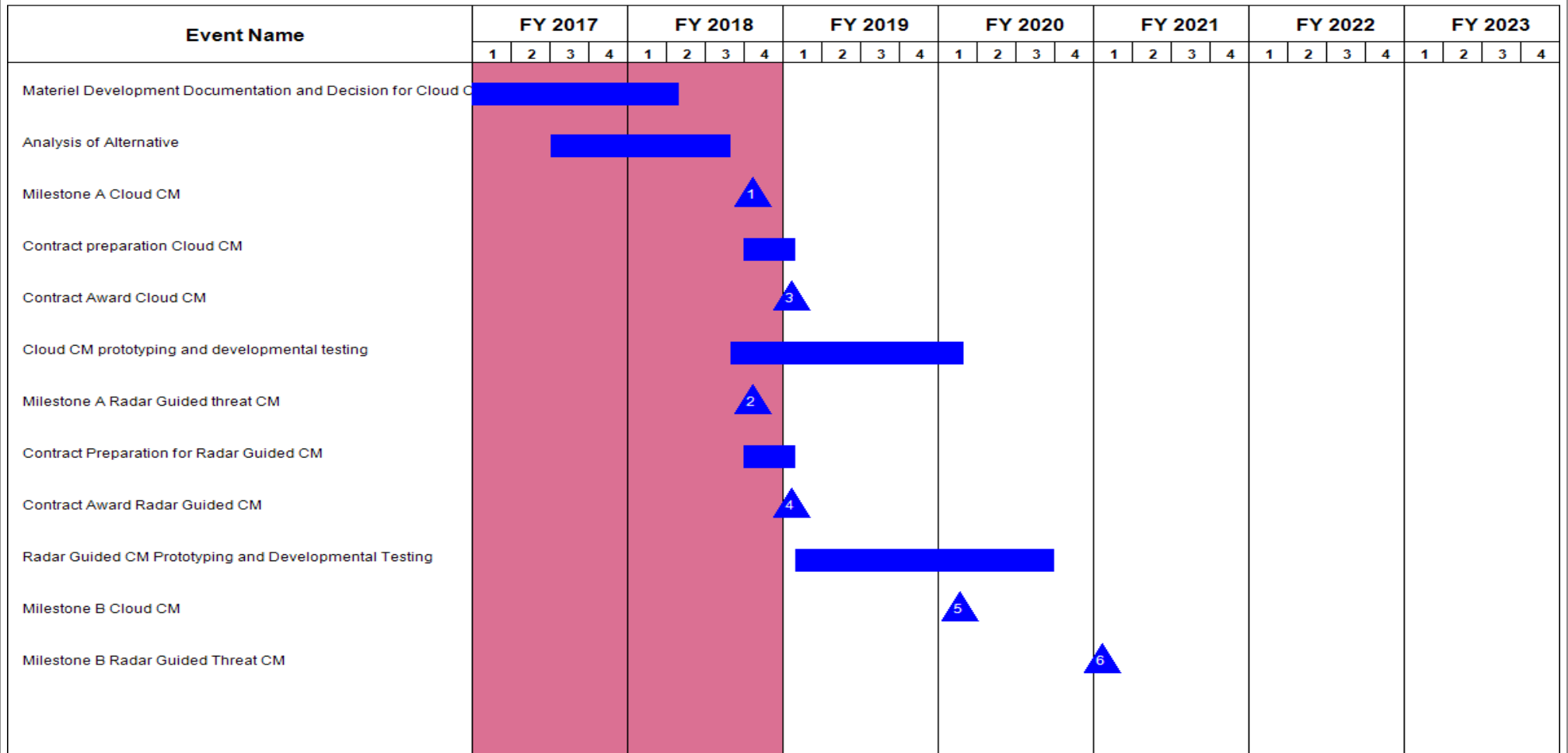
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AOA Development	MIPR	TRAC : Ft Leavenworth, KS	-	0.550	Aug 2017	-		-		-		-	0.000	0.550	-
Subtotal			0.500	1.261		0.640		0.500		-		0.500	0.000	2.901	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	2.512	3.469	1.000	2.474	-	2.474	0.000	9.455	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>		Project (Number/Name) EB9 / <i>Aviation Airborne Expandable Countermeasures</i>	



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EB9 / <i>Aviation Airborne Expandable Countermeasures</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Materiel Development Documentation and Decision for Cloud CM	2	2016	2	2018
Analysis of Alternative	3	2017	3	2018
Milestone A Cloud CM	4	2018	4	2018
Contract preparation Cloud CM	4	2018	1	2019
Contract Award Cloud CM	1	2019	1	2019
Cloud CM prototyping and developmental testing	3	2018	1	2020
Milestone A Radar Guided threat CM	4	2018	4	2018
Contract Preparation for Radar Guided CM	4	2018	1	2019
Contract Award Radar Guided CM	1	2019	1	2019
Radar Guided CM Prototyping and Developmental Testing	1	2019	3	2020
Milestone B Cloud CM	1	2020	1	2020
Milestone B Radar Guided Threat CM	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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EC2 / Adv Armor-Piercing (ADVAP) for Small Cal 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
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	0.000	0.000	3.760	-	3.760	6.821	0.000	0.000	0.000	0.000	10.581
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber Advanced Armor-Piercing (ADVAP) technology has been under development since 2015 and applies to multiple caliber ammunition. The initial funding resided in Budget Activity 4 (BA4) PE 0603639 Project EC2. In FY 2017, the funding transitioned from the BA4 Program Element to Budget Activity 5 (BA5) PE 0604802A, Project EP5, Adv Armor-Piercing (ADVAP) for Small Cal Ammo and continues the development of ADVAP 7.62mm ammunition. A follow-on effort to support ADVAP ammunition calibers "below 7.62mm" will commence in FY 2019 under the original BA4 PE 0603639A, Project EC2 Adv Armor-Piercing (AMMO) Small Cal Ammo. It is not a new start but is an effort to continue the development ADVAP ammunition on calibers below 7.62mm.

A. Mission Description and Budget Item Justification

The Advanced Armor-Piercing (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 FY 2019 funding focuses on calibers below 7.62mm. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.

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

	FY 2017	FY 2018	FY 2019
Title: ADVAP Ammunition Technology Maturation & Risk Reduction (TMRR)	-	-	3.760
Description: Develop, demonstrate, and qualify small caliber ADVAP cartridges that can defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.			
FY 2019 Plans: FY 2019 efforts will be focused on building and evaluating ammunition prototypes to refine concepts to mature the technology readiness level and will complete Materiel Development Decision (MDD).			
FY 2018 to FY 2019 Increase/Decrease Statement: Follow-on project beginning in FY2019 for the development of ADVAP ammunition calibers below 7.62mm.			
Accomplishments/Planned Programs Subtotals	-	-	3.760

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018	
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>				Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>			
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>
• EP5: <i>Adv Armor-Piercing (ADVAP) for Small Caliber Ammo</i>	12.452	11.571	21.019	-	21.019	4.783	13.953	6.918	6.446	0.000	77.142
Remarks											
This funding line supports Engineering & Manufacturing Development (EMD) activities for the ADVAP ammunition. Including the development of ADVAP ammunition for the Next Generation Squad Weapon (NGSW).											
D. Acquisition Strategy											
The ADVAP ammunition programs will use a Government developed design and manufacturing process. Multiple component contracts will be awarded to purchase raw materials and equipment. In FY 2016, the ADVAP effort accomplished design optimization, manufactured prototypes, and demonstrated TRL 6 for XM1158. Milestone (MS) B occurred in 1st Quarter FY 2017 leading to fabrication and testing of qualification hardware for the 7.62mm cartridge. Developmental efforts for the ADVAP ammunition 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.											
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 / 4						R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EC2 / Adv Armor-Piercing (ADVAP) for Small Cal 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	0.658	-		-		0.060		-		0.060	Continuing	Continuing	Continuing
Prototype Manufacturing	C/FFP	Jet Industrial : New Jersey	1.039	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
Phase 1 Propellant Development	C/FFP	ATK : Virginia	0.141	-		-		-		-		-	0.000	0.141	-
Phase 2 Propellant Development	C/FFP	TBD : TBD	-	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
Subtotal			1.838	-		-		1.060		-		1.060	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	6.387	-		-		1.700		-		1.700	Continuing	Continuing	Continuing
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	1.000	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
Subtotal			7.387	-		-		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
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	3.200	-		-		0.500		-		0.500	Continuing	Continuing	Continuing
Subtotal			3.200	-		-		0.500		-		0.500	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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development					Project (Number/Name) EC2 / Adv Armor-Piercing (ADVAP) for Small Cal 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		12.425	-		0.000		3.760		-		3.760	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

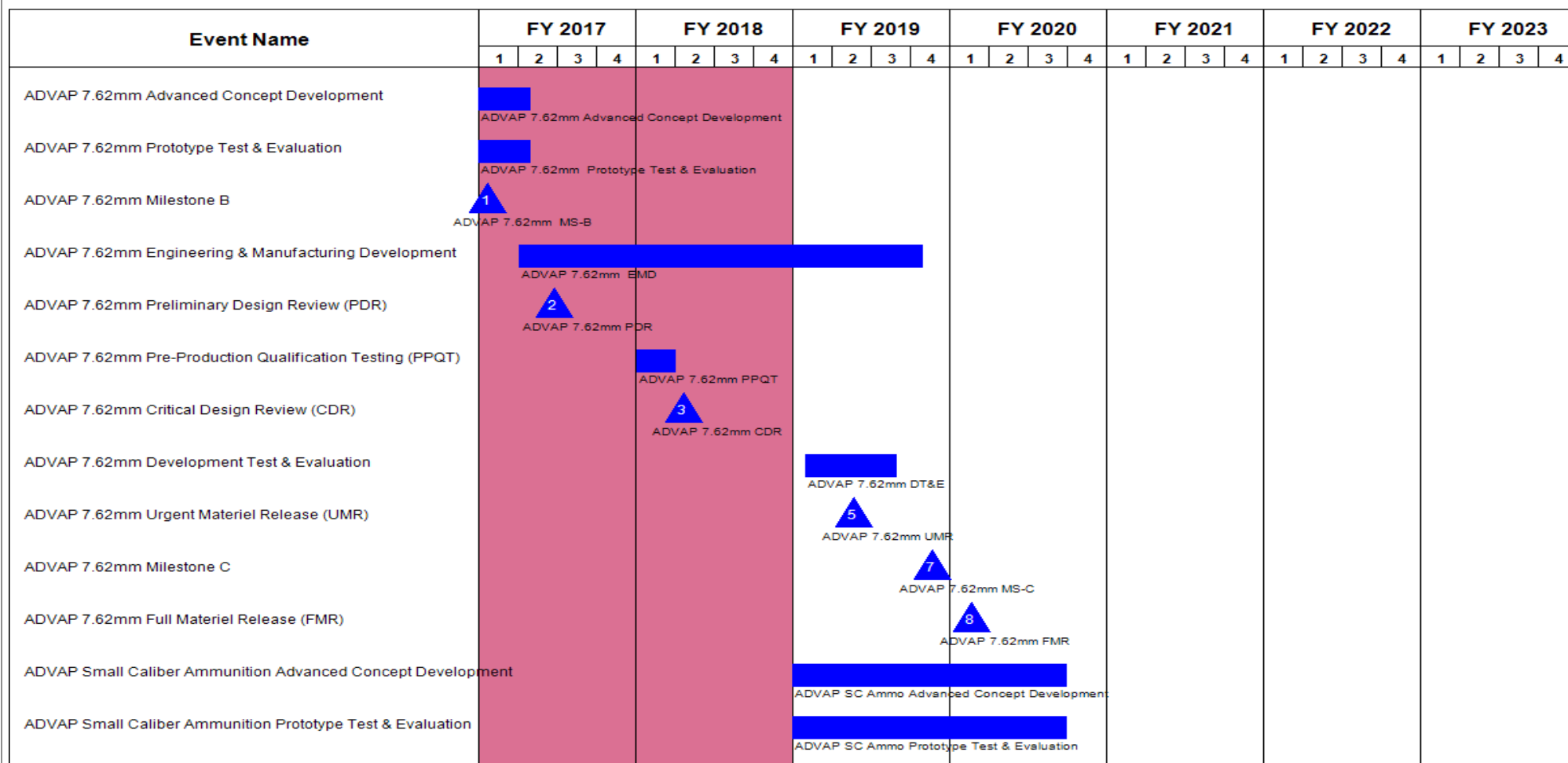
2040 / 4

R-1 Program Element (Number/Name)

PE 0603639A / Weapons and Munitions -
Advanced Development

Project (Number/Name)

EC2 / Adv Armor-Piercing (ADVAP) for
Small Cal Ammo



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

Date: February 2018

Appropriation/Budget Activity

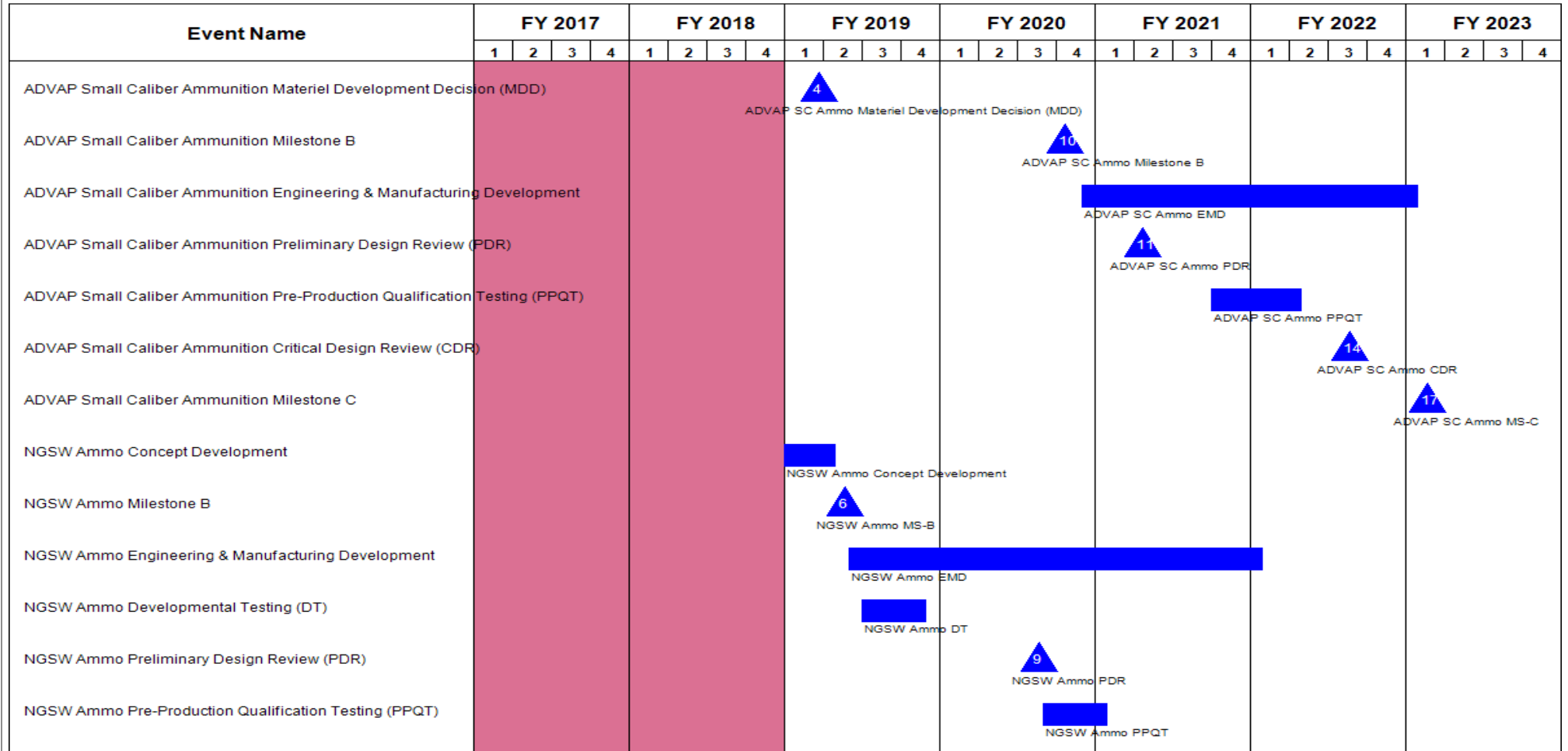
2040 / 4

R-1 Program Element (Number/Name)

PE 0603639A / Weapons and Munitions - Advanced Development

Project (Number/Name)

EC2 / Adv Armor-Piercing (ADVAP) for Small Cal Ammo

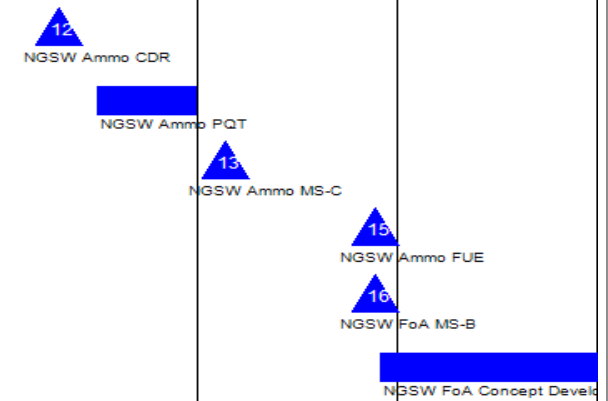


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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army **Date:** February 2018

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal Ammo</i>
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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 Production Qualification Testing (PQT)																												
NGSW Ammo Milestone C																												
NGSW Ammo First Unit Equipped (FUE)																												
NGSW Family of Ammo Milestone B																												
NGSW Family of Ammo Concept Development																												



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC2 / <i>Adv Armor-Piercing (ADVAP) for Small Cal 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 / 4	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development		Project (Number/Name) EC2 / Adv Armor-Piercing (ADVAP) for Small Cal 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 (FUE)	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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EC3 / Ammunition 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
EC3: Ammunition Logistics Prototyping	-	1.940	1.677	1.315	-	1.315	1.507	1.695	2.145	1.778	0.000	12.057
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2019 Program Element (PE) 0603639A, Project EC3, Ammunition Logistics Prototyping will transition to E00700 CTG, 5.56mm, all types, E22203 Cartridges, Tank, 105mm and 120mm, all types, E80100 155mm Extended Range M982, and E08200 CTG, 25mm, all types.

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. FY 2019 funding will be used to complete verification testing and an operational demonstration for the environmental health monitoring system. FY 2019 funding will also continue verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability, and continue the maturation of the design and fabrication of prototype plastic polymer rectangular containers for developmental 5.56mm ammunition.

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

	FY 2017	FY 2018	FY 2019
Title: Munitions Health and Inventory Monitoring Systems	0.722	1.177	0.900
Description: Performance and reliability of certain munitions can be degraded by the environmental exposure history they have experienced in their lifetime. This Project will develop simple to complex environmental health and inventory monitoring systems to improve reliability and asset visibility and enable effective Condition Based Management for Ammunition.			
FY 2018 Plans: Complete system component integration and conduct verification testing and an operational demonstration for the environmental health monitoring system. Complete prototype development and verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability.			
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development	Project (Number/Name) EC3 / Ammunition Logistics Prototyping		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Complete verification testing and an operational demonstration for the environmental health monitoring system. Continue verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability. FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 requires slightly less funding than FY 2018 because project will be transitioning to BA 5 in FY2019.				
Title: Munitions Containerization Systems Description: For each family of munitions containers, optimize prototype container systems for automation compatibility, combat unit load quantity, sustainability/recyclability, Insensitive Munitions/explosives safety, environmental protection, load reconfiguration, unitization, and standardized interfaces. This will improve ammunition distribution efficiency while minimizing environmental and operational impacts. FY 2018 Plans: Mature design and fabricate prototype plastic polymer rectangular containers for developmental 5.56mm ammunition. FY 2019 Plans: Perform design verification prototype testing and award contract to produce production representative polymer containers in preparation for qualification testing with 5.56 mm ammunition. FY 2018 to FY 2019 Increase/Decrease Statement: Funding in FY 2019 requires slightly less funding than FY 2018 as the project is prepared for production of qualification items for testing with 5.56 mm ammunition..		0.735	0.500	0.415
Title: Insensitive Munitions (IM) Integration Description: Optimize multiple IM technologies to improve munitions survivability and warfighter safety. Advanced IM Technologies will be developed in the areas of warhead, propulsion and propellants, explosives, packaging, and barriers. Efforts will increase the number of IM compliant ammunition items fielded in order to mitigate munitions reaction to unplanned stimuli such as fire, fragments, enclosed heat build-up (cook-off), bullets, adjacent munitions reaction (sympathetic detonation), and shape charge jet attacks.		0.483	-	-
Accomplishments/Planned Programs Subtotals		1.940	1.677	1.315
C. Other Program Funding Summary (\$ in Millions) N/A				

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC3 / <i>Ammunition Logistics Prototyping</i>
C. Other Program Funding Summary (\$ in Millions)		
Remarks In FY 2019 Program Element (PE) 0603639A, Project EC3, Ammunition Logistics Prototyping will transition to E00700 CTG, 5.56mm, all types, E22203 Cartridges, Tank, 105mm and 120mm, all types, E80100 155mm Extended Range M982, and E08200 CTG, 25mm, all types.		
D. Acquisition Strategy Munitions Health Monitoring and Munitions Containerization systems will be developed through government and industry prototype efforts. In FY 2019 a Technology Readiness Assessment will be conducted to measure the progress of the designs.		
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 / 4						R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development						Project (Number/Name) EC3 / Ammunition 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
Contract - Low Cost Thermal Indicator	C/TBD	TBD : TBD	1.630	-		-		-		-		-	0.000	1.630	-
Contract - RRAPDS	C/TBD	TBD : TBD	0.703	0.550		0.550		0.686		-		0.686	0.000	2.489	-
Contract-Plastic Cylindrical Container	C/TBD	TBD : TBD	0.250	0.300		0.500		-		-		-	0.000	1.050	-
Contract-Insensitive Munitions	C/TBD	TBD : TBD	0.476	0.100		-		-		-		-	0.000	0.576	-
Subtotal			3.059	0.950		1.050		0.686		-		0.686	0.000	5.745	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	1.987	0.840		0.477		0.379		-		0.379	0.000	3.683	-
Subtotal			1.987	0.840		0.477		0.379		-		0.379	0.000	3.683	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 Proving Ground	MIPR	Yuma : AZ	0.086	-		-		-		-		-	0.000	0.086	-
Test and Eval	MIPR	TBD : TBD	-	0.150		0.150		0.250		-		0.250	0.000	0.550	-
Subtotal			0.086	0.150		0.150		0.250		-		0.250	0.000	0.636	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			5.132	1.940		1.677		1.315		-		1.315	0.000	10.064	N/A
Remarks															

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

Date: February 2018

Appropriation/Budget Activity
2040 / 4

R-1 Program Element (Number/Name)
PE 0603639A / *Weapons and Munitions - Advanced Development*

Project (Number/Name)
EC3 / Ammunition 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
Advanced Concept Development-Munitions Health Monitoring-1																												
	RRAPDS-Phase 1																											
Advanced Concept Development-Munitions Health Monitoring-1A																	RRAPDS-Phase 2											
Advanced Concept Development-Munitions Health Monitoring-2																												
	Low Cost Thermal Indicator																											
Advanced Concept Development-Munitions Containerization-1													Munitions Containerization-Plastic Cylindrical Container															
Advanced Concept Development-Munitions Containerization-1A													Munitions Containerization-Plastic Rectangular Container															
Advanced Concept Development-Insensitive Munitions	Insensitive Munitions																											
Advanced Concept Development-Munitions Health Monitoring-3																												
					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 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EC3 / <i>Ammunition Logistics Prototyping</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Advanced Concept Development-Munitions Health Monitoring-1	2	2015	4	2020
Advanced Concept Development-Munitions Health Monitoring-1A	1	2021	4	2023
Advanced Concept Development-Munitions Health Monitoring-2	2	2015	4	2022
Advanced Concept Development-Munitions Containerization-1	4	2019	4	2021
Advanced Concept Development-Munitions Containerization-1A	1	2020	4	2021
Advanced Concept Development-Insensitive Munitions	1	2016	4	2017
Advanced Concept Development-Munitions Health Monitoring-3	3	2017	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EL7 / Reduced Range 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
EL7: Reduced Range Ammunition	-	1.314	7.600	7.618	-	7.618	0.000	0.000	0.000	0.000	0.000	16.532
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note												
The small caliber Reduced Range Ammunition (RRA) technology applies to multiple calibers. As the technology matures in FY 2019, Program Element (PE) 0603639A, Project EL7, Reduced Range Ammunition for the 7.62mm variant will transition to PE 0604802A, Project EP3, Reduced Range Ammunition - Small Caliber. In FY 2020, the .50 Caliber variant will transition from Program Element (PE) 0603639A, Project EL7 to PE 0604802A, Project EP3.												
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. Funding will also explore lessons learned from the United States Marine Corp (USMC) .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	
Title: Technology Maturation and Risk Reduction (TMRR)									1.314	7.600	7.618	
Description: Develop, demonstrate, and qualify small caliber 7.62mm and .50 caliber ammunition that will provide a reduced range training capability to the M240 and M2 gunner.												
FY 2018 Plans: FY 2018 focuses on activities on both 7.62mm and .50 caliber reduced range ammunition. 7.62mm prototypes will undergo Technology Readiness Level (TRL) 6 assessment and enter into Design Verification Testing (DVT) after a down select in preparation for Milestone B documentation. .50 caliber will conduct the Materiel Development Decision (MDD) and initiate the Technology Maturation and Risk Reduction phase by assessing several prototypes for TRL 5.												
FY 2019 Plans: FY 2019 primary activities will focus on further assessment of .50 Cal prototypes including leveraging lessons learned from the USMC prototypes, Technology Readiness Level (TRL) 6 assessment, conducting System Readiness Review (SRR), preparation												

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PE 0603639A: *Weapons and Munitions - Advanced Develop...*
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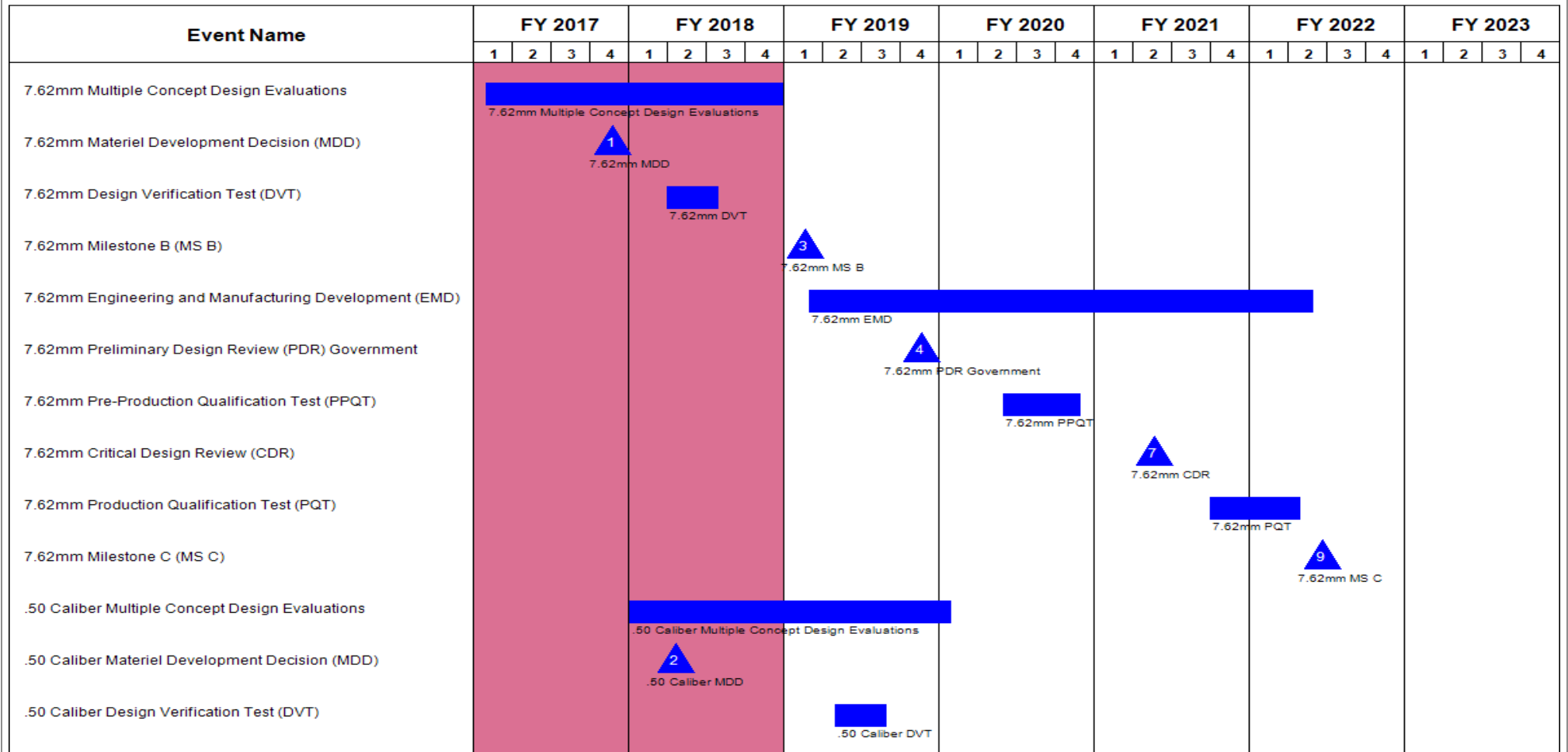
Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EL7 / Reduced Range Ammunition					
Product Development (\$ 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
Program Manager Maneuver Ammunition Systems (PM MAS) - Labor and Travel	Various	Picatinny Arsenal : New Jersey	-	0.060		0.304		0.368		-		0.368	Continuing	Continuing	Continuing
Contractor 1	TBD	TBD : TBD	-	-		1.353		-		-		-	0.000	1.353	-
Contractor 2	TBD	TBD : TBD	-	-		1.353		-		-		-	0.000	1.353	-
Prototype	MIPR	PTI : New Jersey	-	0.157		-		-		-		-	0.000	0.157	-
Hardware	Various	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, New Jersey	-	0.112		-		1.000		-		1.000	Continuing	Continuing	Continuing
Subtotal			-	0.329		3.010		1.368		-		1.368	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	-	0.666		2.340		4.400		-		4.400	Continuing	Continuing	Continuing
Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	-	0.180		0.360		0.850		-		0.850	Continuing	Continuing	Continuing
Subtotal			-	0.846		2.700		5.250		-		5.250	Continuing	Continuing	N/A
Remarks N/A															

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development						Project (Number/Name) EL7 / Reduced Range 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
US Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	-	0.139		1.890		-		-		-	Continuing	Continuing	Continuing
Design Verification Testing (DVT)	TBD	TBD : TBD	-	-		-		1.000		-		1.000	0.000	1.000	-
Subtotal			-	0.139		1.890		1.000		-		1.000	Continuing	Continuing	N/A
Remarks 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			-	1.314		7.600		7.618		-		7.618	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 / 4		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>		Project (Number/Name) EL7 / <i>Reduced Range Ammunition</i>	



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army																Date: February 2018																				
Appropriation/Budget Activity 2040 / 4										R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development										Project (Number/Name) EL7 / Reduced Range 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								
.50 Caliber Milestone B (MS B)													5 ↓ .50 Caliber MS B																							
.50 Caliber EMD																																				
.50 Caliber Engineering and Manufacturing Development (EMD)													6 ↓ .50 Caliber PDR Government																							
.50 Caliber Preliminary Design Review (PDR) Government																	8 ↓ .50 Caliber CDR																			
.50 Caliber Pre-Production Qualification Test (PPQT)																	10 ↓ .50 Caliber MS C																			
.50 Caliber Critical Design Review (CDR)																																				
.50 Caliber Production Qualification Test (PQT)																																				
.50 Caliber Milestone C (MS C)																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL7 / <i>Reduced Range Ammunition</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) Government	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) Government	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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EL8 / LIGHTWEIGHT CARTRIDGE CASE FOR 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
EL8: LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER	-	1.807	2.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.307
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note The Lightweight Small Caliber Ammunition (LSCA) cartridge case technology will be applied to multiple calibers. The project involves developing and qualifying lightweight cartridge case, starting with 7.62mm ammunition, to replace current brass cartridge case. In FY 2019, Program Element (PE) 0603639A, Project EL8, Lightweight Cartridge Case for Small Caliber will transition to PE 0607131A, Project ER6, Direct Fire Technology.												
A. Mission Description and Budget Item Justification The Lightweight Small Caliber Ammunition (LSCA) Project is a critical technology development in response to the 7.62mm Capabilities Development Documents (CDD). The goal of the LSCA Project is to reduce the total Soldier load through reduction in ammunition weight. The LSCA Project will develop and field 7.62mm LSCA cartridges that will provide the same capabilities as the M80A1 and M62A1 cartridges. The LSCA cartridge will be designed to be compatible with all Army 7.62mm weapon systems, but optimized to work in the M240 Machine Gun.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2017	FY 2018	FY 2019	
Title: 7.62mm Technology Maturation & Risk Reduction (TMRR) for Lightweight Small Caliber Ammunition (LSCA)									1.807	2.500	-	
Description: Develop, demonstrate, and qualify a Lightweight Small Caliber Ammunition (LSCA) 7.62mm capability that will provide ten to fifty percent ammunition weight savings.												
FY 2018 Plans: Phase II Contractor is developing a preliminary lightweight cartridge design. The Government is completing the Systems Requirement Review and Preliminary Design Review then beginning Pre-Validation Testing.												
FY 2018 to FY 2019 Increase/Decrease Statement: Project EL8, LSCA will transition to PE 0607131A, Project ER6, Direct Fire Technology in FY 2019.												
Accomplishments/Planned Programs Subtotals									1.807	2.500	-	
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	
• ER6: Direct Fire Technology	-	0.855	3.500	-	3.500	2.570	1.520	0.600	-	Continuing	Continuing	

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018	
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EL8 / LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER			
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>
<u>Remarks</u>											
The funding lines continue work on the 7.62mm ammunition which will transition to Program Element 0607131A, Project ER6, Direct Fire Technology in 2019.											
<u>D. Acquisition Strategy</u>											
Multiphase development contracts. Phase I and Phase II include development and evaluation of multiple designs/concepts. The Government intends to down-select to one design for Phase III in FY 2019 to manufacture test hardware to support Validation Testing planned for FY 2020. Low Rate Initial Production award will occur in FY 2021.											
<u>E. Performance Metrics</u>											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) EL8 / <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>			
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 : New Jersey	0.089	0.162		0.120		-		-		-	Continuing	Continuing	Continuing
Lightweight Case Phase 1 Development Contract	C/FFP	Orbital ATK : Missouri	0.636	-		-		-		-		-	0.000	0.636	-
Lightweight Case Phase 2 Development Contract 1	TBD	Picatinny Arsenal : New Jersey	-	-		0.440		-		-		-	Continuing	Continuing	Continuing
Lightweight Case Phase 2 Development Contract 2	TBD	Picatinny Arsenal : New Jersey	-	-		0.440		-		-		-	Continuing	Continuing	Continuing
Research	MIPR	United States Military Academy : New York	0.150	-		-		-		-		-	0.000	0.150	-
Phase 2 Case Development	C/FP	Nammo Talley : Mesa, Arizona	-	0.783		-		-		-		-	0.000	0.783	-
Modeling & Simulation	C/FP	Concurrent Technologies Corporation (CTC) : New Jersey	-	0.261		-		-		-		-	0.000	0.261	-
Lightweight Case Manufacturing Evaluation	SS/FP	Orbital ATK : Plymouth, Minnesota	-	0.316		-		-		-		-	0.000	0.316	-
Subtotal			0.875	1.522		1.000		-		-		-	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	0.375	0.285		0.800		-		-		-	Continuing	Continuing	Continuing
Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	-	-		0.180		-		-		-	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity					R-1 Program Element (Number/Name)					Project (Number/Name)					
2040 / 4					PE 0603639A / Weapons and Munitions - Advanced Development					EL8 / LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER					
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
Subtotal			0.375	0.285		0.980		-		-		-	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
US Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	0.039	-		0.520		-		-		-	Continuing	Continuing	Continuing
Temperature testing	MIPR	Armament Research Development and Engineering Center : New Jersey	0.010	-		-		-		-		-	0.000	0.010	-
Subtotal			0.049	-		0.520		-		-		-	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			1.299	1.807		2.500		-		-		-	Continuing	Continuing	N/A
Remarks															

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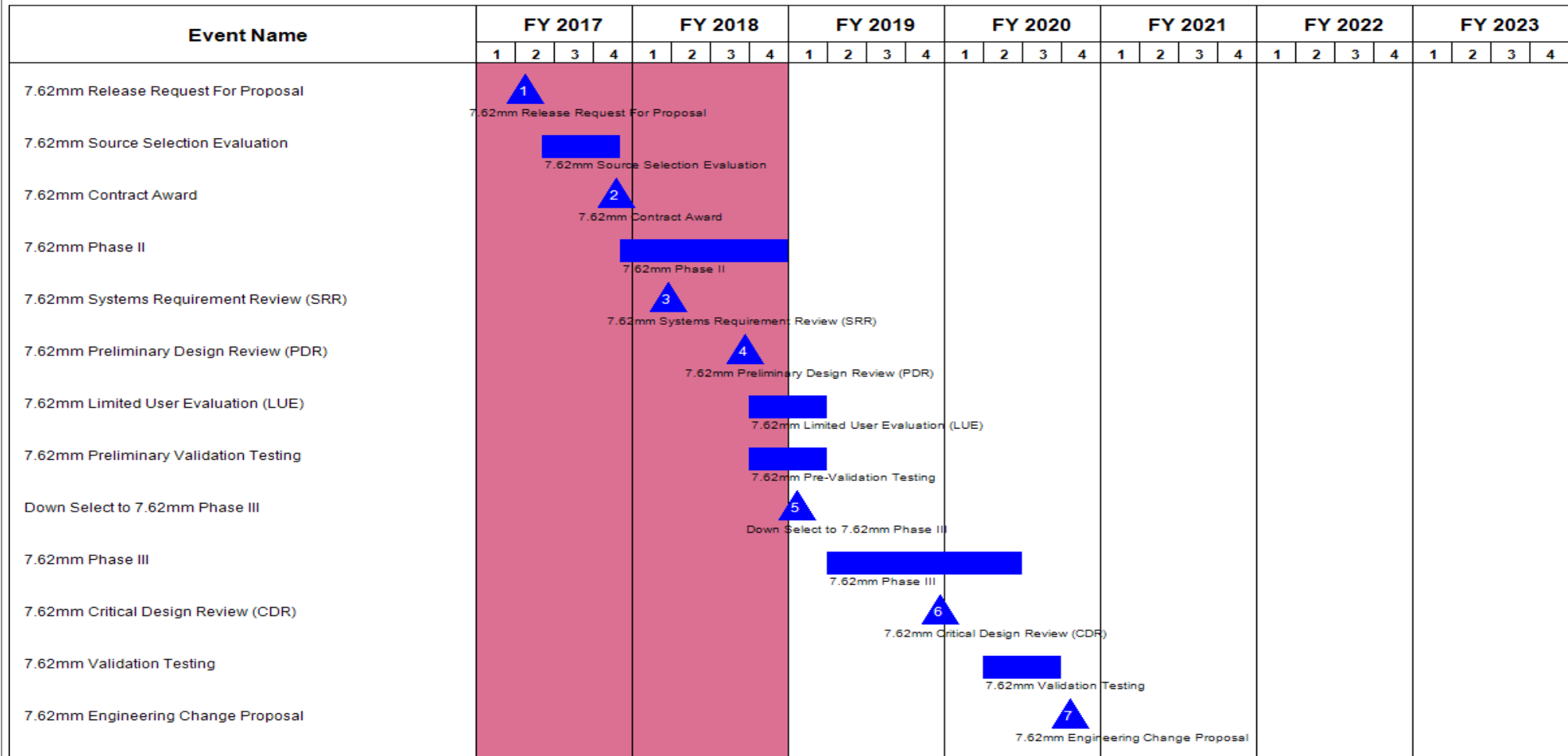
Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army

Date: February 2018

Appropriation/Budget Activity
2040 / 4

R-1 Program Element (Number/Name)
PE 0603639A / *Weapons and Munitions - Advanced Development*

Project (Number/Name)
EL8 / *LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER*



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army																Date: February 2018																					
Appropriation/Budget Activity 2040 / 4										R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development										Project (Number/Name) EL8 / LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER																	
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
7.62mm Low Rate Initial Production (LRIP) Award																						<div>8</div> <div>7.62mm LRIP Award</div>															

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EL8 / <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Release Request For Proposal	2	2017	2	2017
7.62mm Source Selection Evaluation	2	2017	4	2017
7.62mm Contract Award	4	2017	4	2017
7.62mm Phase II	4	2017	4	2018
7.62mm Systems Requirement Review (SRR)	1	2018	1	2018
7.62mm Preliminary Design Review (PDR)	3	2018	3	2018
7.62mm Limited User Evaluation (LUE)	4	2018	1	2019
7.62mm Preliminary Validation Testing	4	2018	1	2019
Down Select to 7.62mm Phase III	1	2019	1	2019
7.62mm Phase III	2	2019	2	2020
7.62mm Critical Design Review (CDR)	4	2019	4	2019
7.62mm Validation Testing	2	2020	3	2020
7.62mm Engineering Change Proposal	4	2020	4	2020
7.62mm Low Rate Initial Production (LRIP) Award	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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EU1 / 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
EU1: Enhanced Lethality Cannon Munitions	-	9.486	10.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.486
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.

A. Mission Description and Budget Item Justification

The Enhanced Lethality Cannon Munitions (ELCM) project evaluates, develops, matures, and demonstrates new lethality technologies for 155mm cannon artillery munitions and evaluates their effectiveness in mitigating evolving and derived capability gaps, and support transition to Engineering Manufacturing Development (EMD). The ELCM project prototypes and accelerates the maturation of enhanced lethality technologies, such as Lithographic Fragmentation Technology (LFT) or pre-formed fragmentation, for 155mm cannon artillery munitions. The ELCM project accelerates the development and maturation of LFT for subsequent integration 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. ELCM also supports prototyping of enhanced lethality technologies applicable to 155mm cannon artillery munitions, including prototyping of projectile design, explosive formulations, fragmentation, and software for the 155mm XM1113 effort, which is a potential long-range cannon projectile that will increase range by 10km or greater and contain twice as much rocket motor grains as the current 155mm long range cannon projectile that is now obsolete. The design requires increased lethality since the projectile contains a reduced amount of explosive to make room for the increased amount of rocket motor grains required for increased range. ELCM addresses requirements for increased lethality above the current U.S. Army go-to-war 155mm high explosive unitary projectiles, the M795 Insensitive Munition and obsolete M549A1 Unitary Munition.

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

	FY 2017	FY 2018	FY 2019
Title: Enhanced Lethality Cannon Munitions	9.486	4.900	-
Description: Evaluate, Develop, Prototype and Demonstrate Enhanced Lethality technologies.			
FY 2018 Plans: Conduct prototyping of enhanced lethality technologies applicable to 155mm cannon artillery munitions.			
FY 2018 to FY 2019 Increase/Decrease Statement: Decrease in funds in FY 2019 due to the maturation and transition of enhanced lethality technologies.			
Title: 155mm HE Rocket Assist Project (RAP) Extended Range	-	5.100	-
Description: Evaluate, Develop, and Demonstrate Extended Range technologies.			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018	
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019
<i>FY 2018 Plans:</i> Conduct a Critical Design Review. Complete Technology Readiness Level (TRL) TRL6 live demonstration in the 39 caliber weapon system. Complete Milestone B Decision.			
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Decrease in funds in FY 2019 due to transition of enhanced lethality technologies to Budget Activity (BA) 5 Program Element (PE) 0604802A Project EU6, 155mm High Explosive Extended Range Artillery, in FY 2019.			
Accomplishments/Planned Programs Subtotals	9.486	10.000	-

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• EU6: 155mm High Explosive Extended Range Artillery	-	-	7.000	-	7.000	5.000	3.000	-	-	0.000	15.000

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
 As pre-Milestone B advanced component development and competitive prototyping projects, these efforts will identify, develop, prototype, evaluate, analyze, and demonstrate potential enhanced lethality and extended range alternative solutions for Government and/or Industry. These efforts will quantify the respective maturity and effectiveness to mitigate capability gaps against representative enemy target sets and operational scenarios. Enhanced lethality and extended range technologies will be evaluated for merit and transition onto new cannon artillery munitions programs of record as appropriate. Following Milestone B, new cannon munitions programs will enter EMD.

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 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>			
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
ELCM Prototyping	MIPR	Various : Various	-	4.260		3.900		-		-		-	0.000	8.160	-
XM1113 Prototyping	MIPR	Various : Various	-	-		1.000		-		-		-	0.000	1.000	-
XM1113 Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC): ATK : TBD	-	-		1.600		-		-		-	0.000	1.600	-
Subtotal			-	4.260		6.500		-		-		-	0.000	10.760	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
ELCM Program Management	MIPR	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.430		0.400		-		-		-	0.000	0.830	-
XM1113 Program Management	MIPR	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		0.400		-		-		-	0.000	0.400	-
ELCM Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	2.046		0.600		-		-		-	0.000	2.646	-
XM1113 Engineering Support	MIPR	Armament Research Development Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		0.800		-		-		-	0.000	0.800	-
Subtotal			-	2.476		2.200		-		-		-	0.000	4.676	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>			
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
Performance-related Lethality Developmental Testing	MIPR	Naval Surface Warfare Center (NSWC) - Dahlgren : Dahlgren, VA	-	0.610		1.100		-		-		-	0.000	1.710	-
Lethality Simulations and Evaluation	MIPR	Army Materiel Systems Analysis Activity (AMSA) : Aberdeen, MD	-	0.640		-		-		-		-	0.000	0.640	-
Lethality Simulations and Evaluation	MIPR	US Training and Doctrin Command (TRADOC); White Sands Missile Range (TRAC-WSMR) : White Sands Missile Range, New Mexico	-	1.500		-		-		-		-	0.000	1.500	-
Performance-related Lethality Developmental Testing	MIPR	Army Test and Evaluation Command (ATEC): Yuma Proving Ground : Yuma, AZ	-	-		0.200		-		-		-	0.000	0.200	-
Subtotal			-	2.750		1.300		-		-		-	0.000	4.050	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			-	9.486		10.000		-		-		-	0.000	19.486	N/A
Remarks															

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

Date: February 2018

Appropriation/Budget Activity

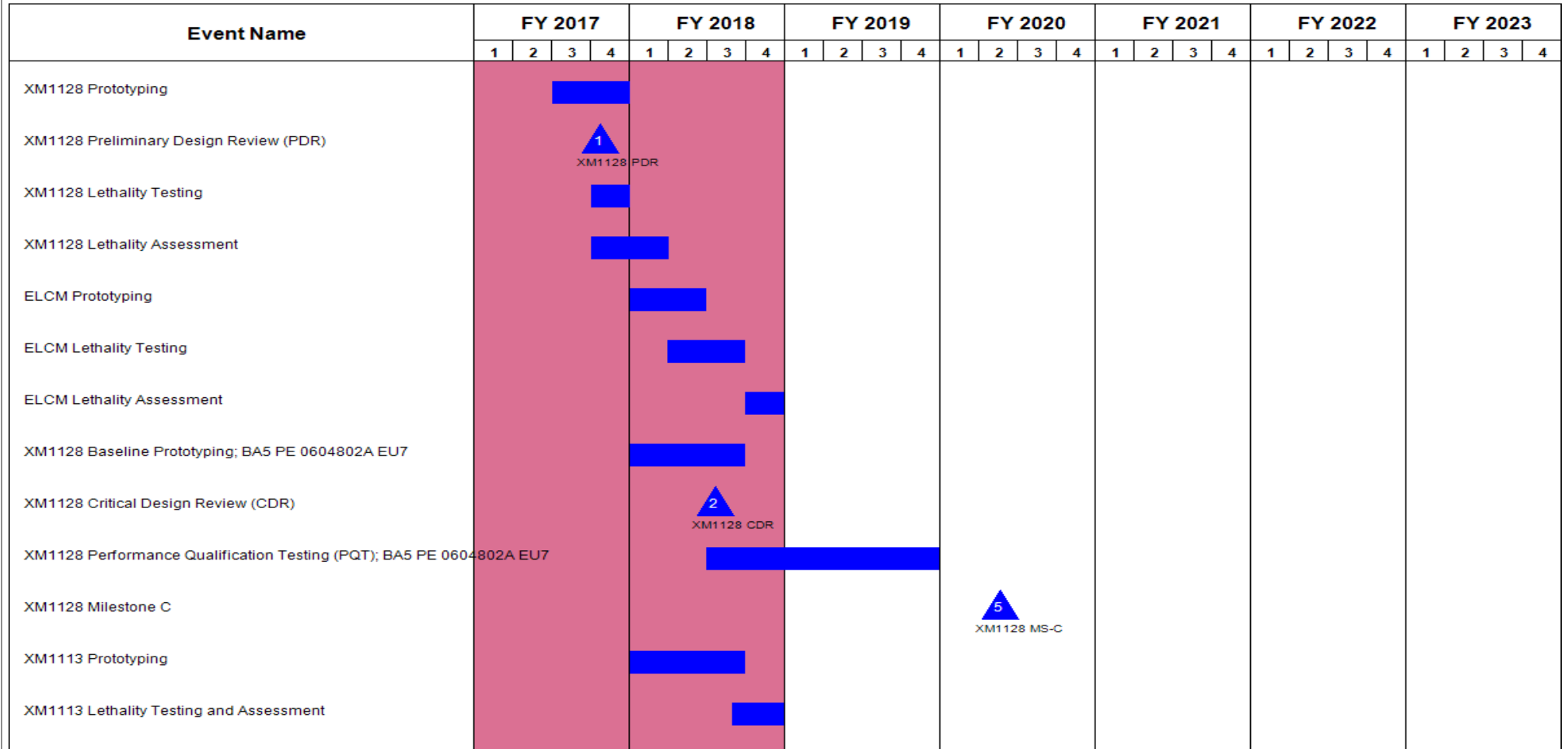
2040 / 4

R-1 Program Element (Number/Name)

PE 0603639A / Weapons and Munitions -
Advanced Development

Project (Number/Name)

EU1 / Enhanced Lethality Cannon Munitions



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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>		Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon 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
XM1113 Preliminary Design Review (PDR); BA5 PE 0604802A EU6																												
XM1113 Critical Design Review (CDR); BA5 PE 0604802A EU6																												
XM1113 Performance Qualification Testing (PQT); BA5 PE 0604802A EU6																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU1 / <i>Enhanced Lethality Cannon Munitions</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM1128 Prototyping	3	2017	4	2017
XM1128 Preliminary Design Review (PDR)	4	2017	4	2017
XM1128 Lethality Testing	4	2017	4	2017
XM1128 Lethality Assessment	4	2017	1	2018
ELCM Prototyping	1	2018	2	2018
ELCM Lethality Testing	2	2018	3	2018
ELCM Lethality Assessment	4	2018	4	2018
XM1128 Baseline Prototyping; BA5 PE 0604802A EU7	1	2018	3	2018
XM1128 Critical Design Review (CDR)	3	2018	3	2018
XM1128 Performance Qualification Testing (PQT); BA5 PE 0604802A EU7	3	2018	4	2019
XM1128 Milestone C	2	2020	2	2020
XM1113 Prototyping	1	2018	3	2018
XM1113 Lethality Testing and Assessment	3	2018	4	2018
XM1113 Preliminary Design Review (PDR); BA5 PE 0604802A EU6	4	2018	4	2018
XM1113 Critical Design Review (CDR); BA5 PE 0604802A EU6	4	2019	4	2019
XM1113 Performance Qualification Testing (PQT); BA5 PE 0604802A EU6	1	2020	3	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) EU2 / Improved Multi-Option Fuze (iMOFA/iMOFM)			
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
EU2: Improved Multi-Option Fuze (iMOFA/iMOFM)	-	7.588	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.588
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Improved Multi-Option Fuze (iMOFA/iMOFM) project will identify, develop, prototype, and demonstrate new improved multi-option fuze technologies, components, and subsystems based on Government-owned Next Generation Proximity Sensor (NGPS) capabilities with 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. This project will support technology maturation and risk reduction, and will evaluate and analyze producibility, affordability, safety, and compatibility of these prototype potential materiel solutions in representative realistic performance-related developmental tests. This project will enable fact-based analysis of new Government-owned height of burst/proximity fuzing alternatives that are resistant to enemy countermeasures and reverse engineering threats, quantify their effectiveness, reduce integration risk, and support transition into existing/new artillery/mortar fuzes and munitions.

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

	FY 2017	FY 2018	FY 2019
Title: Improved Multi-Option Fuze	7.588	-	-
Description: Identify, develop, prototype, and assess improved multi-option fuze technologies.			
Accomplishments/Planned Programs Subtotals	7.588	-	-

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• EU8: <i>Improved Multi-Option Fuze</i>	-	8.000	8.000	-	8.000	10.000	-	-	-	0.000	26.000
Remarks											

D. Acquisition Strategy

As an advanced component development and risk reduction project, this effort will identify, develop, prototype, evaluate, analyze, and demonstrate potential improved Multi-Option Fuze component solutions from Government and/or Industry. This effort will quantify their respective maturity and assess and mitigate the level of risk in providing conventional Cannon Artillery and Mortar munitions a height of burst/proximity fuzing capability that is resistant to enemy countermeasures and reverse engineering threats. Appropriate mature potential solutions will be selected for subsequent transition and technical implementation as an inherent part of improved Multi-Option Fuze programs of record via subsequent Engineering and Manufacturing Development program for Type Classification into existing multi-option fuzes for Cannon

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PE 0603639A: *Weapons and Munitions - Advanced Develop...*
Army

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) EU2 / <i>Improved Multi-Option Fuze (iMOFA/iMOFM)</i>			
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 Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	5.259	Jun 2017	-		-		-		-	0.000	5.259	5.892
Subtotal			-	5.259		-		-		-		-	0.000	5.259	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, New Jersey	-	0.652	Jun 2017	-		-		-		-	0.000	0.652	0.652
Engineering Studies	MIPR	United States Military Academy : West Point, NY	-	0.100	Jun 2017	-		-		-		-	0.000	0.100	0.100
Subtotal			-	0.752		-		-		-		-	0.000	0.752	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 Evaluations	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	1.477	Jun 2017	-		-		-		-	0.000	1.477	0.500
Improved Multi-Option Fuze Tests	MIPR	Army Research Lab (ARL) : Adelphi, MD	-	0.100	Jul 2017	-		-		-		-	0.000	0.100	0.500
Subtotal			-	1.577		-		-		-		-	0.000	1.577	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018						
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development					Project (Number/Name) EU2 / Improved Multi-Option Fuze (iMOFA/ iMOFM)							
					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					-	7.588		0.000		-		-		-	0.000	7.588	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018	
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>		Project (Number/Name) EU2 / <i>Improved Multi-Option Fuze (iMOFA/iMOFM)</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
Identify, Develop, and Prototype Candidate for Technology Solution; BA4 EU2																												
Conduct Performance-Related Developmental Tests; BA4 PE 0603639A EU2																												
Evaluate and Analyze Prototype Solutions and Transition Technology; BA4 PE 06036																												
Fabricate Prototypes; Transition to 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 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) EU2 / <i>Improved Multi-Option Fuze (iMOFA/iMOFM)</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Identify, Develop, and Prototype Candidate for Technology Solution; BA4 EU2	3	2017	1	2018
Conduct Performance-Related Developmental Tests; BA4 PE 0603639A EU2	1	2018	3	2018
Evaluate and Analyze Prototype Solutions and Transition Technology; BA4 PE 06036	2	2018	1	2019
Fabricate Prototypes; Transition to 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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) FA5 / Assured Precision Weapons and 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
FA5: Assured Precision Weapons and Munitions	-	9.779	13.000	14.340	-	14.340	11.862	7.907	0.000	0.000	0.000	56.888
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Assured Precision Weapons and Munitions (APWM) project is a continuation of efforts initiated under Budget Activity 4 (BA4) Program Element (PE) 0604120A Project ED5. The objective of this advanced risk mitigation, prototyping and product support effort is to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems in a system of systems environment. The APWM efforts directly support three of the Chief of Staff of the Army's (CSA) "Big 6" Modernization Priorities. Specifically, they support; Long Range Precision Fires, Network/C3I (incl Assured PNT), and Soldier Lethality. The APWM project will enable increased lethality and ensure future battlefield success against peer/near-peer adversaries by supporting these Modernization Priorities. Current and evolving threats to existing Positioning, Navigation, and Timing (PNT) capabilities have created the need for new/emerging Assured PNT capabilities (including M-Code GPS and Pseudolites) into both Munitions and Weapons operating in a complex system-of-systems environment. This imperative is reinforced by Public Law 111-383 Section 913 which mandates the use of Air Force-developed M-Code GPS capabilities in all systems fielded FY2018 and beyond unless a waiver is obtained from the Secretary of Defense. As such, both precision weapon and munition programs must coordinate with the development and technology delivery activities of the Air Force's Military GPS User Equipment (MGUE) program and the Army's Assured PNT program to protect and insure critical precision-based Joint warfighting capabilities as well as maximizing effectiveness and efficiency of US taxpayer investments. FY 2019 funding will support the development and technology delivery activities of the Air Force's MGUE program and the Army's Assured PNT program including participation in design reviews, evaluation and formal feedback on systems requirements and technology performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, configuration management of the evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions (PGM), and specific support focus includes requirements for MGUE Increment 2, Pseudolites (PL), and Alternative Navigation (AltNav) related technology maturity for Assured PNT milestone decisions.

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

	FY 2017	FY 2018	FY 2019
Title: Assured Precision Weapons and Munitions Integrated Product Support - Joint Lethality PNT SME WIPT	1.614	2.900	2.255
Description: Provide assured precision weapons and munitions technical subject matter expertise and support to the Oversight board for assured precision weapons and munitions.			
FY 2018 Plans: The subject matter experts will continue coordinating with and supporting the development and technology delivery activities of the Air Force's MGUE program and the Army's Assured PNT program including participation in design reviews, evaluation and formal feedback on systems requirements and technology performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, and configuration management of the			

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development	Project (Number/Name) FA5 / Assured Precision Weapons and Munitions		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions. Specific support focus includes requirements for MGUE Increment 2 and Pseudolite related technology maturity for Assured PNT Milestone decisions. FY 2019 Plans: The subject matter experts will continue coordinating with and supporting the development and technology delivery activities of the Air Force's MGUE program and the Army's Assured PNT program including participation in design reviews, evaluation and formal feedback on systems requirements and technology performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, and configuration management of the evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions. Specific support focus includes requirements for MGUE Increment 2 and Pseudolite related technology maturity for Assured PNT Milestone decisions. FY 2018 to FY 2019 Increase/Decrease Statement: Decrement is due to Air Force SME feedback requiring less funds to support the WIPT based on previous WIPT demands.				
Title: PGM MGUE Anti-Spoof Risk Reduction Effort Description: Implementing Anti-Spoof (AS) capabilities on MGUE PGM receivers is a major risk to PGMs (including Precision Guidance Kit (PGK)). This effort will identify, evaluate, and quantify the predicted performance of AS capabilities against various MGUE PNT threat scenarios and their corresponding impacts on Time To Assured Navigation (TTAN) for PGMs and resulting operational performance impacts to reduce risk to multiple adopting PGM Programs of Record (PoRs).		8.165	-	-
Title: Assured PNT related Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD) Description: Mature and test Zero-Age-of-Data (ZAOD) for improved measurement accuracy of Network Assisted GPS data provided to Users. FY 2018 Plans: Initiate analysis, evaluation and implementation of Zero-Age-of-Data (ZAOD) in Network Assisted GPS to provide Users with more accurate GPS Satellite Data to improve mission effectiveness. FY 2018 to FY 2019 Increase/Decrease Statement: Zero Age of data implementation will be completed in FY18. No funds will be needed for this effort in FY19.		-	0.500	-
Title: Assured PNT related Integration Risk Mitigation - Family of Scatterable Mines (FASCAM) Replacement		-	-	0.767

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018
Description: Evaluate, mature and test assured position, navigation, and timing (A-PNT) system/subsystem components for area denial and area denial enabling technologies. FY 2019 Plans: Initiate analysis and evaluation of various assured precision prototype technologies for future area denial and area denial enabling technologies to support the PoR in their Analysis of Alternatives (AoA). FY 2018 to FY 2019 Increase/Decrease Statement: PNT efforts for FASCAM will start in FY19.			
Title: Assured PNT related Integration Risk Mitigation - Modified NA GPS & VMF to support PL & M-Code for Weapons & Munitions (Phase 1 & 2) Description: Evaluate, mature and test technologies for Network Assisted GPS that supports Pseudolites and M-code for Weapons through two phased efforts (phase 1 & 2) FY 2018 Plans: Architecture development, message interface definitions, use case definition and requirements development for an updated NA GPS prototype that incorporates PL and M-Code. FY 2019 Plans: Software development, integration and test for an updated NA GPS prototype that incorporates PL and M-Code in phase 1. FY 2018 to FY 2019 Increase/Decrease Statement: Effort started in FY18 with requirements development and will transition to software development and test in FY19 requiring more support.		-	4.200
Title: Assured PNT related Weapons and Munitions Prototyping - PGK with Upgraded PGM Fuze Setter Description: Develop, prototype, and evaluate required emerging Assured PNT technology enhancements to the PGM Fuze Setter needed to enable continued performance of Precision Guided Munitions in a threat environment. FY 2018 Plans: Architecture development, message interface definitions, use case definition and requirements development for an upgraded PGM Fuze Setter incorporating PL and M-Code to enable continued performance of Precision Guided Munitions in a threat environment. FY 2019 Plans:		-	3.500
			2.680

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development	Project (Number/Name) FA5 / Assured Precision Weapons and Munitions		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Software development, integration and test for a prototype upgraded PGM Fuze Setter incorporating PL and M-Code to enable continued performance of Precision Guided Munitions in a threat environment. FY 2018 to FY 2019 Increase/Decrease Statement: Effort includes many stakeholders and SMEs for FY18 activities of requirement development. Team does not need to be as large for FY19 plans of implementing requirements defined in FY18.				
Title: Assured PNT related Weapons and Munitions Prototyping - M-code & PLs on Towed Howitzer Platforms - M77A2 & M119A3 Description: Prototype and evaluate MGUE Increment 1 (M-code) GPS receiver cards in the M777A2 and M119A3 Towed Howitzer Platforms and evaluate technologies for providing Assured PNT to PGMs. FY 2018 Plans: Update GPS receiver interfaces on fire platforms, integrating and testing the MGUE Inc 1 cards and assessing performance impacts FY 2019 Plans: Update GPS receiver interfaces on fire platforms, integrating and testing the MGUE Inc 1 cards PL interoperability and assessing performance impacts. FY 2018 to FY 2019 Increase/Decrease Statement: Majority of software updates and testing will be conducted in FY18. FY19 will include testing only and does not require a large support team.		-	1.100	0.472
Title: Assured PNT related Weapons and Munitions Prototyping - Alternative Navigation Technologies (AltNav) (Phase 1 & 2) Description: Develop, prototype, and evaluate non Global Positioning System Radio Frequency (Non-GPS RF) Navigation prototype systems for indirect fires support platform navigation systems through two phased efforts (Phase 1 & 2) FY 2018 Plans: Examine and define how non GPS RF Navigation technology can meet current navigation and timing requirements without access to GPS and how concept can aid GPS in a GPS degraded environment. FY 2019 Plans: Prototyping and evaluation of non Global Positioning System Radio Frequency (GPS RF) Navigation prototype systems that can meet current navigation and timing requirements without access to GPS or in a GPS degraded environment in phase 1. FY 2018 to FY 2019 Increase/Decrease Statement:		-	0.800	1.866

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018
FY18 tasks include requirements development and prototype planning efforts which do not require a large team. FY19 tasks include conducting prototyping and testing which requires a larger technical team for support and increased funding.			
Accomplishments/Planned Programs Subtotals		9.779	13.000
C. Other Program Funding Summary (\$ in Millions) N/A			
Remarks			
D. Acquisition Strategy The Planned Acquisition Strategy for the Assured Precision Weapons and Munitions program is to utilize the Defense Ordinance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) contract mechanism to obtain prototypes to demonstrate and evaluate the maturity and integration risk of the M-Code GPS on Precision Cannon Munitions and Weapons as well as other Assured PNT related capabilities.			
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 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>			
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
PGM MGUE AS Risk Reduction	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	7.785	Dec 2016	-		-		-		-	Continuing	Continuing	Continuing
Assured PNT related Weapons Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		3.265	Dec 2017	3.585	Dec 2018	-		3.585	Continuing	Continuing	Continuing
Assured PNT related Weapons Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		2.000	Dec 2017	2.000	Dec 2018	-		2.000	Continuing	Continuing	Continuing
Assured PNT related Munitions Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		2.500	Dec 2017	2.500	Dec 2018	-		2.500	Continuing	Continuing	Continuing
Assured PNT related Munitions Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		2.000	Dec 2017	2.000	Dec 2018	-		2.000	Continuing	Continuing	Continuing
Subtotal			-	7.785		9.765		10.085		-		10.085	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
Program Management	Various	Program Executive Office (PEO) Ammunition (Ammo) : Picatinny Arsenal, NJ	-	0.508	Dec 2016	0.625	Dec 2017	0.655	Dec 2018	-		0.655	Continuing	Continuing	Continuing
Assured Precision Weapons and Munitions IPT Support	MIPR	Various : Various	-	1.106	Dec 2016	2.155	Dec 2017	1.600	Dec 2018	-		1.600	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>			
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
Assured Technologies Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.380	Dec 2016	0.455	Dec 2017	1.200	Dec 2018	-		1.200	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Communication Electronics Research, Development and Engineering Center (CERDEC) : Aberdeen Proving Ground, MD	-	-		-		0.800	Dec 2018	-		0.800	Continuing	Continuing	Continuing
Subtotal			-	1.994		3.235		4.255		-		4.255	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			-	9.779		13.000		14.340		-		14.340	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 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FA5 / <i>Assured Precision Weapons and Munitions</i>
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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
PGM MGUE Anti-Spoof (AS) Risk Reduction Effort																												
Integration Risk Mitigation - Modified NA GPS & VMF to support PL & M-Code																												
Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD)																												
Integration Risk Mitigation - Family of Scatterable Mines (FASCAM) Replacement																												
Integration Risk Mitigation - Modified NA GPS & VMF for GMLRS & Launcher																												
Integration Risk Mitigation - Fire System-of-Systems PL related C2 & AS																												
Integration Risk Mitigation - System of Systems Test																												
Weapons & Munitions Prototyping - A-PNT related PGK w Upgraded Cannon PGM Fuz																												
Weapons & Munitions Prototyping - M777A2 & M119A3 MGUE Increment 1																												
Weapons & Munitions Prototyping - Alternative Navigation Technologies																												
Integrated Product Support - Joint Lethality PNT SME WIPT/Progr																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development	Project (Number/Name) FA5 / Assured Precision Weapons and Munitions	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PGM MGUE Anti-Spoof (AS) Risk Reduction Effort	1	2017	4	2017
Integration Risk Mitigation - Modified NA GPS & VMF to support PL & M-Code	1	2018	4	2021
Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD)	1	2018	4	2018
Integration Risk Mitigation - Family of Scatterable Mines (FASCAM) Replacement	1	2019	4	2020
Integration Risk Mitigation - Modified NA GPS & VMF for GMLRS & Launcher	1	2020	4	2021
Integration Risk Mitigation - Fire System-of-Systems PL related C2 & AS	1	2021	4	2022
Integration Risk Mitigation - System of Systems Test	1	2022	4	2023
Weapons & Munitions Prototyping - A-PNT related PGK w Upgraded Cannon PGM Fuze	1	2018	4	2019
Weapons & Munitions Prototyping - M777A2 & M119A3 MGUE Increment 1	1	2018	4	2019
Weapons & Munitions Prototyping - Alternative Navigation Technologies	1	2018	4	2021
Intregrated Product Support - Joint Lethality PNT SME WIPT/Program Management	1	2017	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)			
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
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.000	1.000	4.947	-	4.947	8.897	14.826	19.765	22.724	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Cannon-Delivered Area Effects Munitions (C-DAEM) Project will analyze, identify, develop, prototype, and demonstrate 155mm Cannon Artillery munition area effects capability. C-DAEM are envisioned as a suite of 155mm artillery munitions, to provide U.S. ground forces with a capability to effectively engage area targets to destroy, neutralize and/or suppress threat platforms and facilities, and deny threat forces full operational freedom within the targeted area. Initial objective values for C-DAEM would meet Dual Purpose Improved Conventional Munitions (DPICM) effects capabilities against personnel and light vehicles and exceed DPICM effects capabilities against armor. An Analysis of Alternatives (AoA) will be completed to best inform necessary area effect lethality requirements. The Project addresses requirements from the U.S. Army adopted U.S. Marine Corps (USMC) C-DAEM Initial Capabilities Document (ICD) [Army Requirements Oversight Council (AROC) adopted 20 October 2016, Joint Requirements Oversight Council (JROC) approved 11 May 2016]. The approved C-DAEM ICD as an Army requirement is located in the Capabilities and Army Requirements Documents number 0438. The Joint Staffing Designator is JROC Interest. FY 2019 will support the preparation and evaluation of the Request for Proposals (RFP) for technologies and capabilities identified through the AoA, as well as the development of the Capabilities Development Document (CDD) for each technology.

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

	FY 2017	FY 2018	FY 2019
Title: C-DAEM AoA	-	1.000	4.947
Description: The C-DAEM AoA will assess a range of alternatives for replacing the DPICM for current 155mm cannon systems. The goal is to inform the Milestone Decision Authority (MDA) of cost-effective and affordable alternatives that provide performance similar to or better than DPICM.			
FY 2018 Plans: Complete C-DAEM AoA to inform C-DAEM required capabilities. Conduct Milestone A review with MDA.			
FY 2019 Plans: FY 2019 will support the preparation and evaluation of the Request for Proposals (RFP) for technologies and capabilities identified through the AoA, as well as the development of the Capabilities Development Document (CDD) for each technology.			
FY 2018 to FY 2019 Increase/Decrease Statement: In FY 2018, PE 0603639A Project FG1, Cannon-Delivered Area Effects Munitions was a New Start. Upon completion of MS-A, Program Office will initiate competitive prototyping in FY 2019.			
Accomplishments/Planned Programs Subtotals			4.947

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FG1 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks D. Acquisition Strategy As a Pre-Milestone A project in the Milestone Solution Analysis (MSA) phase, this effort will inform desired C-DAEM capabilities. Milestone A currently planned for 4Q FY 2018. C-DAEM will execute a competitive prototyping Technology Maturation Risk Reduction (TMRR) phase 1Q FY 2019 through 4Q FY 2020 in preparation for Milestone B on materiel solutions to meet capabilities informed by the AoA and Requirements. 1Q FY 2021 through 4Q FY 2023, C-DAEM will execute the Engineering & Manufacturing Development (EMD) and complete Milestone C in 4Q FY 2023.		
E. Performance Metrics N/A		

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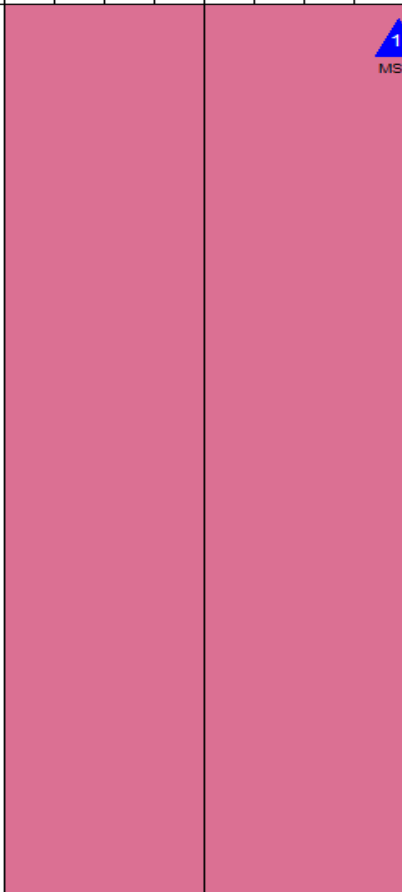











Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>						Project (Number/Name) FG1 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>			
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
C-DAEM Prototype Hardware	MIPR	TBD : TBD	-	-		-		2.400	Dec 2018	-		2.400	Continuing	Continuing	Continuing
Subtotal			-	-		-		2.400		-		2.400	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
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		1.000	Dec 2017	-		-		-	Continuing	Continuing	Continuing
Engineering Support	MIPR	Armament Research Development Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		2.147	Dec 2018	-		2.147	Continuing	Continuing	Continuing
Subtotal			-	-		1.000		2.147		-		2.147	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
C-DAEM Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		-		0.400	Dec 2018	-		0.400	Continuing	Continuing	Continuing
Subtotal			-	-		-		0.400		-		0.400	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 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)				
	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	-	-		1.000		4.947		-		4.947	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 / 4										R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development								Project (Number/Name) FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)																														
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																																																
C-DAEM Prototyping																																																
C-DAEM Lethality Assessment																																																
C-DAEM TMRR Demonstration																																																
Preliminary Design Review (PDR)																																																
Milestone B																																																
C-DAEM EMD Development Testing (DT)																																																
Critical Design Review (CDR)																																																
Production Qualification Testing (PQT)																																																
Milestone C																																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) FG1 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone A	4	2018	4	2018
C-DAEM Prototyping	1	2019	2	2019
C-DAEM Lethality Assessment	3	2019	2	2020
C-DAEM TMRR Demonstration	3	2020	4	2020
Preliminary Design Review (PDR)	4	2020	4	2020
Milestone B	4	2020	4	2020
C-DAEM EMD Development Testing (DT)	1	2021	4	2021
Critical Design Review (CDR)	4	2021	4	2021
Production Qualification Testing (PQT)	1	2022	4	2023
Milestone C	4	2023	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) XT5 / 30mm Anti-Personnel and Counter UAS			
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
XT5: 30mm Anti-Personnel and Counter UAS	-	0.000	2.475	3.859	-	3.859	5.832	0.000	0.000	0.000	0.000	12.166
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note In FY 2018, Program Element 0603639A, Project XT5, 30mm Anti-Personnel and Counter UAS is a new start program.												
A. Mission Description and Budget Item Justification Lightweight 30mmx113mm (LW30) Airburst is a new capability identified as a Warfighter requirement in the Capability Production Document (CPD), AH-64E Helicopter, Increment 1, Version 6. The LW30 airburst cartridge improves the ability of the warfighter to effectively engage anti-personnel/materiel targets due to increased lethality. Airburst capability provides the user a much higher probability of achieving a first burst kill against enemy personnel targets in the open. The LW30 will retain its dual purpose warhead, allowing it to continue to defeat light armored threats through point detonation. The cartridge provides increased lethal effects against personnel & soft-skin vehicular targets increasing Soldier Survivability on the ground during troops in contact engagements and decreases the required number of rounds to reach the desired lethal effects. FY 2019 continues to support the Technology Maturation and Risk Reduction effort.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2017	FY 2018	FY 2019	
Title: Pre Engineering Manufacturing Development Activities									-	2.475	3.859	
Description: Pre-Milestone B approval. Technology Readiness Level 6 must be demonstrated.												
FY 2018 Plans: FY 2018 primary activities include conducting an industry day, technology maturation and risk reduction activities. Awards will be made to multiple vendors to develop the critical technologies such as the safe and arm and proximity electronics. These two technologies, and others, will be designed and tested at the sub-system level for integration into the M789 round												
FY 2019 Plans: FY 2019 activities include continuing activities to reduce risk and mature technology with a goal of a Technology Readiness Level 6 demonstration of the ability to select airburst or point detonating (PD) functionality when fired from a M230 ground mounted weapon system. Vendors will continue to develop the critical technologies to be designed and tested at the sub-system level for integration into the M789 round. The main effort in FY 2019 will focus on ammunition and system integration which will culminate with the demonstration of a proximity round fired from a ground mounted weapon.												
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 / 4			R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development			Project (Number/Name) XT5 / 30mm Anti-Personnel and Counter UAS					
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2017	FY 2018	FY 2019		
FY 2019 funding required for additional technology maturation ahead of Milestone B.											
Accomplishments/Planned Programs Subtotals							-	2.475	3.859		
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
• XT6: 30mm Anti-Personnel and Counter-Air - Eng Dev	-	-	0.000	-	0.000	8.996	4.942	4.941	4.940	0.000	23.819
Remarks											
D. Acquisition Strategy											
The initial development of the Lightweight 30mm (LW30, 30mmx113mm) Airburst cartridge during the Technology Maturation and Risk Reduction (TMRR) phase will occur via competitive prototyping using Other Transaction Authority (OTA) awards to two contractors to demonstrate Technology Readiness Level (TRL) 6. For the first phase of Engineering and Manufacturing Development (EMD), two Full and Open competitive contracts will be awarded. Prior to Developmental Test & Evaluation (DT&E), the Government will down-select to a single contractor for EMD completion followed by a contract for Low Rate Initial Production (LRIP) and two production 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 / 4						R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) XT5 / 30mm Anti-Personnel and Counter UAS					
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
Prototype Design Contractor 1	C/CPFF	TBD : TBD	-	-		0.800		1.000		-		1.000	Continuing	Continuing	-
Prototype Design Contractor 2	C/CPFF	TBD : TBD	-	-		0.800		1.000		-		1.000	Continuing	Continuing	-
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : NJ	-	-		0.225		0.185		-		0.185	Continuing	Continuing	-
Program Manager Apache (PM Apache)	MIPR	Redstone Arsenal : AL	-	-		0.200		0.200		-		0.200	Continuing	Continuing	-
Subtotal			-	-		2.025		2.385		-		2.385	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	-	-		0.450		0.450		-		0.450	Continuing	Continuing	-
Subtotal			-	-		0.450		0.450		-		0.450	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
Ammunition Design Engineering Test (DET) 1	C/FFP	TBD : TBD	-	-		-		0.512		-		0.512	Continuing	Continuing	-
Ammunition Design Engineering Test (DET) 2	C/FFP	TBD : TBD	-	-		-		0.512		-		0.512	Continuing	Continuing	-
Subtotal			-	-		-		1.024		-		1.024	Continuing	Continuing	N/A

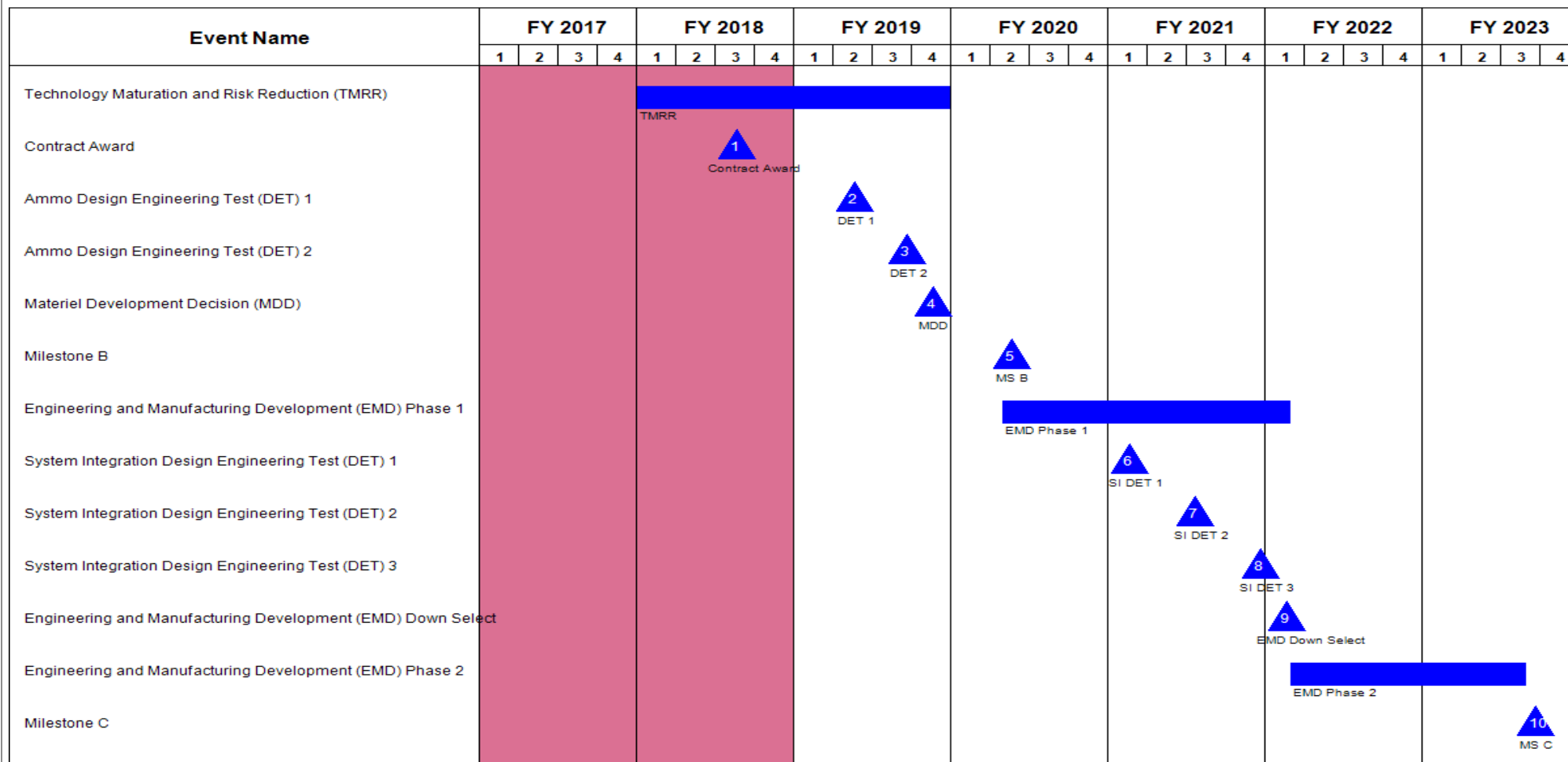
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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army											Date: February 2018		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Weapons and Munitions - Advanced Development				Project (Number/Name) XT5 / 30mm Anti-Personnel and Counter UAS				
	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	-	-		2.475		3.859		-		3.859	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 / 4		R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>		Project (Number/Name) XT5 / <i>30mm Anti-Personnel and Counter UAS</i>	



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / <i>Weapons and Munitions - Advanced Development</i>	Project (Number/Name) XT5 / <i>30mm Anti-Personnel and Counter UAS</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Maturation and Risk Reduction (TMRR)	1	2018	4	2019
Contract Award	3	2018	3	2018
Ammo Design Engineering Test (DET) 1	2	2019	2	2019
Ammo Design Engineering Test (DET) 2	3	2019	3	2019
Materiel Development Decision (MDD)	4	2019	4	2019
Milestone B	2	2020	2	2020
Engineering and Manufacturing Development (EMD) Phase 1	2	2020	1	2022
System Integration Design Engineering Test (DET) 1	1	2021	1	2021
System Integration Design Engineering Test (DET) 2	3	2021	3	2021
System Integration Design Engineering Test (DET) 3	4	2021	4	2021
Engineering and Manufacturing Development (EMD) Down Select	1	2022	1	2022
Engineering and Manufacturing Development (EMD) Phase 2	1	2022	3	2023
Milestone C	3	2023	3	2023