Exhibit R-2, RDT&E Budget Item	n Justificat	tion: PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACL	ation, Army D&P)	I BA 4: Adv	anced	R-1 Progra PE 060363	am Elemen 39A I Tank a	t (Number / and Medium	Name) Caliber An	nmunition			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	45.448	41.921	82.146	-	82.146	50.948	58.995	55.524	51.336	Continuing	Continuing
694: Medium Caliber Ammunition	-	8.960	1.482	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.442
BQ4: 155mm Artillery Propulsion XM654	-	0.000	0.000	7.200	-	7.200	0.000	0.000	0.000	0.000	0.000	7.200
EB8: OWL for Small Caliber Ammunition	-	4.097	2.174	2.000	-	2.000	0.000	0.000	0.000	0.000	0.000	8.271
EB9: Aviation Airborne Expandable Countermeasures	-	8.500	2.471	3.186	-	3.186	4.500	6.060	0.000	0.000	0.000	24.717
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	0.000	3.755	6.821	-	6.821	0.000	0.000	0.000	0.000	0.000	10.576
EC3: Ammunition Logistics Prototyping	-	1.677	1.313	1.525	-	1.525	1.715	2.170	1.800	1.836	0.000	12.036
EL7: Reduced Range Ammunition	-	3.429	7.609	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.038
EL8: LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER	-	2.870	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.870
EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	-	0.000	0.000	4.250	-	4.250	0.000	0.000	0.000	0.000	0.000	4.250
FA5: Assured Precision Weapons and Munitions	-	12.480	14.322	31.267	-	31.267	29.907	31.000	31.000	25.000	Continuing	Continuing
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.960	4.941	25.897	-	25.897	14.826	19.765	22.724	24.500	Continuing	Continuing
XT5: 30mm Anti-Personnel and Counter UAS	-	2.475	3.854	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.329

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	
2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced	PE 0603639A I Tank and Medium Caliber Ammunition	
Component Development & Prototypes (ACD&P)		

Note

In FY 2020, Program Element 0603639A, Project BQ4, 155mm Artillery Propulsion XM654, will transition from Budget Activity 03, PE 0603004A, Project 232, Advanced Lethality & Survivability Demo. This Project is not a New Start.

In FY 2020, Program Element 0603639A, Project EU3, 50 Caliber All-Purpose Tactical Cartridge (APTC), is a New Start.

A. Mission Description and Budget Item Justification

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 for small, medium and large caliber munitions, tank ammunition, mortar ammunition, cannon artillery ammunition, and close combat system items. 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.

Project 694, Medium Caliber Ammunition: Develop 30x113mm self-destructing airburst munitions and qualify 30x113mm linked ammunition for ground vehicles. Increase precision and lethality capability to defeat personnel and materiel targets as well as support the Joint Urgent Operational Need (JUON CC-0558) to counter the rapidly evolving threat of Unmanned Aerial Systems. This effort will qualify the links for use with existing M788 and M789 ammunition and develop self-destructing and airburst capable munitions fired from the Lightweight 30x113mm Link Fed Chain Gun. There is no funding requested in FY 2020.

Project BQ4, 155mm Artillery Propulsion XM654: The XM654E2 Supercharge is a unitary top-zone 155mm propelling charge optimized and required for use with 58caliber XM907E2 Extended Range Cannon with Slide-block breech for use with the XM1299 Extended Range Cannon Artillery (ERCA) Self-propelled Howitzer (SPH). It will achieve lethality overmatch at ranges of approximately 70km from XM907E2 Extended Range Cannon with developmental extended range projectiles, and will increase range with legacy projectiles by thirty percent. The XM654E2 Supercharge is composed of combustible cases with integral metal Stub Case utilizing existing electrically initiated Tank Primer and advanced artillery propellant. Knowledge points will determine compatibility with automated ammunition handling systems. FY 2020 funds will support design risk reduction and prototype maturation towards Engineering Manufacturing and Development (EMD) to support ERCA SPH Increment 2 to support of the Army's modernization priorities in support of the National Defense Strategy.

Project EB8, OWL for Small Caliber: 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 and 5.56mm are the immediate focus followed by a similar development strategy for .50 caliber cartridges. FY 2020 funding supports continued testing and evaluation of the 5.56mm OWL prototype solutions in order to mature the Technology Readiness Level (TRL).

Project EB9, Aviation Airborne Expandable Countermeasures: This project supports 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

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition
(SAM) systems. These efforts will evaluate integrated technologies and counter help expedite technology transition from the laboratory to operational use by de complex Army aircraft platforms. These expendable countermeasures systems coordinated with the PEO Aviation and its platform program managers and with Need Statement (JUONS) CC-0558 Counter - Unmanned Aerial Systems (CU/ Radar Guided decoy. This decoy is designed to defeat specific threat types. De XM215 and RF Countermeasures (CM).	The stress of their operation is classified. Conduct initial developmental/operational testing on
Project EC2, The Advanced Armor-Piercing (ADVAP) project is a critical technologian capabilities Development Documents (CDD) and the Soldier Lethality Cross Firequirements for new ammunition to support the rapid prototyping/developmen ADVAP ammunition is designed to provide overmatch capability to defeat advancementature for the 7.62mm ADVAP is XM1158.	ology development in response to the 7.62mm and 5.56mm Family of Ammunition unctional Team (SL CFT) Initial Capability Document (ICD) which outlines the t of the Next Generation Squad Weapons (NGSW) under Section 804 Authority. New anced light armored threats within typical machine gun engagement ranges. The
The Next Generation Squad Weapons (NGSW) ammunition has a similar object split into two initial variants, the General Purpose (GP) and the Special Purpose the SP ammunition is XM1184. The overall objective of the ADVAP project is to machine gun and ADVAP ammunition in calibers below 7.62mm.	ctive to the 7.62mm ADVAP which is to defeat hard targets. The NGSW ammunition is e (SP). The nomenclature for the GP ammunition is XM1186 and the nomenclature for to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240
FY 2020 funding supports continuing rapid prototyping/development of the Nex prototypes and maturing prototypes to provide to the weapon system contractor conducting prototype testing. FY 2020 funding also supports conducting a Pre prototype capacity to support planned weapon system testing.	at Generation Squad Weapons (NGSW) Special Purpose (SP) projectile, building for performance evaluation, conducting a Critical Design Review (CDR), and liminary Design Review (PDR) for the SP projectile and performing activities to increase
Project EC3, Ammunition Logistics Prototyping: This Project supports the future ammunition through the advanced development, integration, and demonstratio effectiveness of ammunition operations, to include retrograde, while reducing the distribution, and management (strategic and tactical), prognostics, diagnostics, packaging and palletization. The efficient deployment and sustainment of reliable effectiveness of the ammunition logistics system to ensure the distribution of retesting and an operational demonstration for the environmental health monitori two prototype next generation temperature/humidity sensor with batch interrogated reliability.	e force by improving the distribution, management, reliability and survivability of n of logistics system enablers. These enablers will improve the efficiency and he logistics footprint on the battlefield. Technology areas addressed include handling, and asset visibility, explosives safety, and adaptive and environmentally friendly ble ammunition is vital to success on the battlefield. This Project enhances the operational eliable ammunition to the warfighter. FY 2020 funding will be used to complete verification ng system. FY 2020 funding will also be used to continue verification testing of a type ation and historical data retention capabilities, which will be used for assessing munitions

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)
Component Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	PE 0603639AT Tank and Medium Caliber Ammunition
Project EL7, Reduced Range Ammunition: The small caliber Reduced Range A and .50 caliber Capabilities Development Documents (CDD). The overall object on military installations with Surface Danger Zone (SDZ) restrictions. The relat challenges on training ranges in range restricted areas. Reduce Range Ammu meets training needs while shortening and condensing the surface danger zon ranges. The Reduced Range Ammunition cartridge design will be compatible v M240 and M2 Machine Guns. There is no funding requested in FY 2020.	Ammunition (RRA) project is a critical technology development in response to the 7.62mm ctive of Reduced Range Ammunition is to provide training ammunition suitable for use ively long maximum range of the 7.62mm and .50 caliber service ammunition poses nition will mitigate a training gap on installations by providing a materiel solution that i.e. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted with all Army 7.62mm and .50 caliber weapons but specifically optimized to work in the
Project EL8, Lightweight Cartridge Case for Small Caliber: The Lightweight Sm to the 7.62mm Capabilities Development Documents (CDD). The goal of the L The Lightweight Small Caliber Ammunition Project will develop and field 7.62m as the M80A1 and M62A1 cartridges. The Lightweight Small Caliber Ammuniti optimized to work in the M240 Machine Gun. No funding requested in FY 2020	hall Caliber Ammunition (LSCA) Project is a critical technology development in response SCA Project is to reduce the total Soldier load through reduction in ammunition weight. In lightweight small caliber ammunition cartridges that will provide the same capabilities on cartridge will be designed to be compatible with all Army 7.62mm weapon systems, but).
Project EU3, .50 Caliber All-Purpose Tactical Cartridge (APTC): The All-Purpo the .50 caliber Munitions Capabilities Development Documents (CDD). The ov and improves current legacy .50 caliber ammunition. The All-Purpose Tactical work in the M2 Machine Guns. FY 2020 funding supports Technology Maturati conducting a Materiel Development Decision (MDD), and conducting Design V	se Tactical Cartridge (APTC) project is a critical technology development in response to erall objective of All-Purpose Tactical Cartridge is to deliver a single round that replaces Cartridge will be compatible with all Army .50 caliber weapons but specifically optimized to on and Risk Reduction (TMRR) in preparation for a Technology Readiness Level (TRL) 6, 'erification Tests.
Project FA5, The Assured Precision Weapons and Munitions (APWM) -FA5 Pr product support to identify, evaluate, mature, test, and demonstrate various as subsystems within a complex system of systems environment. The Assured Pr lines of effort through technology development and prototyping that increase le near-peer adversaries as well as improving program performance and affordal Positioning, Navigation and Timing (PNT) and Army M-Code GPS coordinated Modernization Priorities in support of the National Defense Strategy. Funding evaluation, and technology delivery activities of the Air Force's M-Code GPS a architecture input essential for precision weapons and munitions operating in a evaluation, and maturation of alternative positioning, navigation and timing rela and Army cross-functional modernization decisions.	roject is focused on advanced risk mitigation, technology integration, prototyping, and sured precision prototype technologies in weapon and munitions components and recision Weapons and Munitions Project reinforces the National Defense Strategy's major ethality and ensure future combat overmatch success of the Joint Force against peer/ pility for multiple weapons and munitions Programs of Record (PoRs) via Joint Lethality efforts. The Assured Precision Weapons and Munitions Project directly supports Army will support engagement by Weapons and Munitions PNT experts in the development, and Army's Assured PNT programs. Funding will also enable component and subsystem a system of-systems environment, Army M-Code GPS technology integration and ated technologies to enable informed Assured PNT related program of record milestone
Project FG1, Cannon-Delivered Area Effects Munitions (C-DAEM): The Cannor provide U.S. ground forces with the capability to engage area personnel throug area. An Analysis of Alternatives (AoA) was completed in January 2018. The p	n-Delivered Area Effects Munitions (C-DAEM) Project is a two increment approach to gh armored targets, while denying threat forces full operational freedom within the targeted purpose of the C-DAEM AoA was to inform acquisition and investment decisions by the

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	
2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced	PE 0603639A I Tank and Medium Caliber Ammunition	
Component Development & Prototypes (ACD&P)		

Army regarding replacement of the current stockpile of 155mm Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense policy compliant munitions and address anti-armor and extended range capability requirements identified in the C-DAEM Initial Capabilities Document (ICD). The Army validated a two increment solution for C-DAEM. Increment I will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. Increment II will destroy personnel, materiel, air defense artillery and rocket launchers. Increment I and II will be developed simultaneously. FY 2020 resources will fund the competitive demonstrations for Increment I, as well as early detailed design testing supporting the qualification of Increment II to support the Army's modernization priorities in support of the National Defense Strategy.

Project XT5, 30mm Anti-Personnel and Counter UAS: Lightweight 30x113mm (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 antipersonnel/materiel targets due to increased lethality. Airburst capability provides the user with 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 and 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. There is no funding requested in FY 2020.

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	41.452	41.974	43.272	-	43.272
Current President's Budget	45.448	41.921	82.146	-	82.146
Total Adjustments	3.996	-0.053	38.874	-	38.874
 Congressional General Reductions 	-0.026	-0.053			
 Congressional Directed Reductions 	-10.000	-			
 Congressional Rescissions 	-	-			
Congressional Adds	10.450	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	4.804	-			
SBIR/STTR Transfer	-1.232	-			
 Adjustments to Budget Years 	-	-	38.874	-	38.874

Change Summary Explanation

FY 2020 increase of \$20.674 million to support the Army's modernization priorities in support of the National Defense Strategy.

FY 2018 Congressional increase of \$8.000 million to Project 694, Medium Caliber Ammunition.

FY 2018 Congressional increase of \$2.450 million to Project EB9, Aviation Airborne Expandable Countermeasures.

FY 2018 Congressional decrease of \$10.000 million to Project EU1, Enhanced Lethality Cannon Munitions.

Exhibit R-2A, RDT&E Project J	ustification	n: PB 2020 A	Army							Date: Ma	arch 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 060363 Ammunitic	r am Elemen 39A I Tank a on	t (Number/ and Medium	Project (N 694 / <i>M</i> ea	Number/Name) fium Caliber Ammunition				
COST (\$ in Millions)	Prior Years	rior ears FY 2018 FY		FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
694: Medium Caliber Ammunition	-	8.960	1.482	0.000	-	0.000	0.000	0.000	0.000	0.00	0.000	10.442	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
A. Mission Description and Bu Develop 30x113mm self-destruct defeat personnel and materiel ta Systems. This effort will qualify the Lightweight 30x113mm Link Feet	dget Item J cting airburs argets as we the links for d Chain Gun Programs (t munitions a t munitions a all as suppor use with exi n. There is n	1 and qualify : t the Joint L sting M788 no FY 2020	30x113mm Jrgent Oper and M789 a request.	linked amm ational Nee ammunition	nunition for g ed (JUON C and develo	ground vehi C-0558) to o p self-destri	cles. Increa counter the ucting and a	ise precisio rapidly evo airburst cap	n and letha	ality capabilit It of Unmann tions fired fro	y to ed Aerial m the	
Title: Linked 30x113mm Ammur	nition Qualifi	cation and 4	<u>əj</u> Airburst Dev	elonment						8 960	1 4 3 5	FT 2020	
Description: Qualify linked 30x1	113mm amn	nunition and		lf_destructir	na and airbu	irst canable	munitions			0.000	1.400		
FY 2019 Plans: FY 2019 funds will be used to pu evaluation, and to support the Un airbursting munition. FY 2019 to FY 2020 Increase/D Program will complete testing in	urchase links rgent Materi Decrease St EY 2019	s and linked el Release (atement:	ammunitior (UMR) of the	n necessary e 30x113mi	to conduct m self destr	weapon sys	stem integra	ation, testin lopment of	g and an				
Title: FY 2019 SBIR / STTR Tra	nsfer									-	0.047	-	
EV 2010 Plane:	-												
FY 2019 SBIR / STTR Transfer													
FY 2019 Flans. FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/D FY 2019 SBIR / STTR Transfer	ecrease St	atement:											

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition	Project (Number/Name) 694 <i>I Medium Caliber Ammunition</i>
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy An other transaction agreement (OTA) contract will be used to purcha	se links for the 30x113mm ammunition. Linked ammu	nition deliveries will be synchronized with test

An other transaction agreement (OTA) 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 be conducted in FY 2019. Purchase of linked M788 and M789 cartridges will transition to competitive procurement by FY 2020. Efforts to develop a self-destructing airburst capable munition and a guided 30x113mm munition will also be conducted.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 nition	ement (N Tank and	lumber/N Medium (ame) Caliber	Project 694 <i>I M</i>	: (Numbe ledium Ca	r/Name) aliber Amn	nunition	
Product Developme	nt (\$ in M	illions)		FY	2018	FY	2019	FY : Ba	2020 ase	FY	2020 CO	FY 2020 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
30x113mm Self Destruct and Airburst Ammo Development Contract	C/CPFF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	-	7.771	Aug 2018	0.635	Jan 2019	-		-		-	0.000	8.406	-
30x113mm Linked Ammo Development Contract	C/CPFF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	-	0.052	Aug 2018	-		-		-		-	0.000	0.052	-
30x113mm Ammo Fuze Development	C/CPFF	Electronics Development Corporation (EDC) : Columbia, MD	-	0.207	Jun 2018	-		-		-		-	0.000	0.207	-
Program Manager Maneuver Ammunition Systems (PM MAS)	MIPR	PM MAS : Picatinny, NJ	-	0.230	Oct 2017	-		-		-		-	0.000	0.230	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.047		-		-		-	0.000	0.047	-
		Subtotal	-	8.260		0.682		-		-		-	0.000	8.942	N/A
Support (\$ in Million	ıs)			FY	2018	FY	2019	FY	2020 ase	FY	2020 CO	FY 2020 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
30x113mm Ammo Armament Research Development and Engineering Center (ARDEC)	MIPR	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	-	_		0.200	Nov 2018	-		-		-	0.000	0.200	-
		Subtotal	-	-		0.200		-		-		-	0.000	0.200	N/A
		n Colibor Ammuniti													
Army	na wealur	n Callber Ammuniti	υΠ			Page 8 d	of 93		R	-1 Line #	77				66

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 060 Ammur	ogram Ele 3639A / T hition	ement (N ank and i	umber/N Medium (ame) Caliber	Project 694 / <i>M</i>	(Number edium Ca	r/ Name) liber Amm	nunition	
Test and Evaluation ((\$ in Milli	ons)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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
Proximity Ammo Demonstration	MIPR	Aberdeen Testing Center (ATC) : Aberdeen, MD	-	-		0.300	Jul 2019	-		-		-	0.000	0.300	-
Self Destruct Safety Certification Testing	MIPR	Yuma Test Center (YTC) : Aberdeen, MD	-	0.700	Dec 2018	-		-		-		-	0.000	0.700	-
Self Destruct Ammo System Integration Testing	MIPR	Yuma Test Center (YTC) : Aberdeen, MD	-	-		0.300	Jun 2019	-		-		-	0.000	0.300	-
		Subtotal	-	0.700		0.600		-		-		-	0.000	1.300	N/A
			Prior Years	FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY : Of	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	8.960		1.482		-		-		-	0.000	10.442	N/A

Remarks

xhibit R-4, RDT&E Schedule Profile: PB 2020 Army														Date: March 2019														
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (PE 0603639A / Tank and Medium Caliber694 / MedAmmunition694 / Med										ect (N Mea	Number/Name) dium Caliber Ammunition															
F		F١	2018			FY 2	2019		F	Y 20	020		F	FY :	2021			FY	202	22		FY	202	23		FY	202	4
Event Name	1	2	3	4	1	2	3	¥ 1	1	2	3 4	1	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
30x113mm Ammo Development Contract Award			30x11	1 3mm	Ammo	o Contra	act Awar	1																				
30x113mm Ammo Development				30x1	13mm	n Ammo	Develop	ment																				
30x113mm Proximity Ammo Demonstration							2 30x113r	nm Prox	Amm	no Den	10																	
30x113mm Self Destruct Safety Certification Test						30x1	13mm Se	elf Destr	uct S	afety (Cert																	
30x113mm Self Destruct System Integration Testing							30x1	13mm S	elf De	estruct	Integra	ation	Testing	9														
30x113mm Self Destruct Ammo Urgent Material Release							30x1	3 13mm S	Self D	estruc	UMR																	
												•									-							

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019							
ppropriation/Budget Activity 040 / 4	R-1 Program I PE 0603639A <i>Ammunition</i>	R-1 Program Element (Number/Name) PE 0603639A I Tank and Medium Caliber AmmunitionProject (Number/Name) 694 I Medium Caliber Ammunition										
	Schedule Details	5										
	ſ	St	art	E	nd							
Events		Quarter	Year	Quarter	Year							
30x113mm Ammo Development Contract Award		4	2018	4	2018							
30x113mm Ammo Development		4	2018	3	2019							
30x113mm Proximity Ammo Demonstration		4	2019	4	2019							
30x113mm Self Destruct Safety Certification Test		2	2019	3	2019							
30x113mm Self Destruct System Integration Testing		3	2019	4	2019							

4

30x113mm Self Destruct Ammo Urgent Material Release

2019

4

2019

Exhibit R-2A, RDT&E Project Ju	Date: Marc	ch 2019										
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 39A I Tank a n	t (Number/ and Medium	Name) Caliber	Project (N BQ4 / 155/	umber/Nar mm Artillery	ne) Propulsion	XM654
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
BQ4: 155mm Artillery Propulsion XM654	-	0.000	0.000	7.200	-	7.200	0.000	0.000	0.000	0.000	0.000	7.200
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note												

In FY 2020, this Project will transition from Budget Activity 03, PE 0603004A, Project 232, Advanced Lethality & Survivability Demo. This Project is not a New Start.

A. Mission Description and Budget Item Justification

The XM654E2 Supercharge is a unitary top-zone 155mm propelling charge optimized and required for use with 58-caliber XM907E2 Extended Range Cannon with Slide-block breech for use with the XM1299 Extended Range Cannon Artillery (ERCA) Self-propelled Howitzer (SPH). It will achieve lethality overmatch at ranges of approximately 70km from XM907E2 Extended Range Cannon with developmental extended range projectiles, and will increase range with legacy projectiles by thirty percent. The XM654E2 Supercharge is composed of combustible cases with integral metal Stub Case utilizing existing electrically initiated Tank Primer and advanced artillery propellant. Knowledge points will determine compatibility with automated ammunition handling systems. FY 2020 funds will support design risk reduction and prototype maturation towards Engineering Manufacturing and Development (EMD) to support ERCA SPH Increment 2 and in support of the Army's modernization priorities in support of the National Defense Strategy.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: 155mm Artillery Propulsion XM654 Supercharge	-	-	7.200
Description: Unitary top-zone propelling charge for XM907E2 Extended Range Cannon with Slide-block breech for use with ERCA INC 2 to regain range overmatch for 155mm artillery.			
FY 2020 Plans: Perform charge establishment and charge uniformity in preparation for ballistic testing including preliminary blast overpressure and charge verification across operational temperatures. Perform packaging rough handling testing. Evaluate risk reduction activities prior to Milestone B.			
FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funds from FY 2019 to FY 2020 due to continuation of XM654E2 Supercharge efforts from Science & Technology (S&T) for risk reduction and prototype maturation. This Project is not a New Start.			
Accomplishments/Planned Programs Subtotals	-	-	7.200

Exhibit R-2A, RDT&E Project Jus	tification: PB	2020 Army							Date: Ma	rch 2019	
Appropriation/Budget Activity				R-1 P	rogram Eler	nent (Numb	er/Name)	Project (I	Number/Na	me)	
2040 / 4				PE 06 <i>Ammu</i>	03639A / Ta Inition	nk and Medi	um Caliber	BQ4 / 155	5mm Artiller	y Propulsion	n XM654
C. Other Program Funding Sumn	nary (\$ in Milli	ons <u>)</u>									
		-	<u>FY 2020</u>	FY 2020	<u>FY 2020</u>					Cost To	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	Base	000	Total	FY 2021	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	Complete	Total Cost
 232: Advanced Lethality & Survivability Demo 	99.265	70.340	0.000	-	0.000	-	-	-	-	0.000	169.605

Remarks

In FY 2020, this Project will transition from Budget Activity 03, PE 0603004A, Project 232, Advanced Lethality & Survivability Demo. This Project is not a New Start. In FY 2021, this Project will transition to Budget Activity 05, PE 0604802A Project BQ3, 155mm Artillery Propulsion XM654. A Procurement Ammunition, Army funding line will be established in FY 2025.

D. Acquisition Strategy

The XM654E2 Supercharge Technology Maturation and Risk Reduction (TMRR) effort will consist of critical technology prototyping, testing, and demonstration. The Project will utilize the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) for the integration of components such as propellant, combustible case, igniter and stub case into developmental extended range projectiles and fuzes. After achieving Milestone B, the XM654E2 Supercharge Project will conduct competitive Engineering Manufacturing and Development (EMD) tasks aimed at meeting the validated requirement in preparation for Low Rate Initial Production (LRIP).

E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Arm	У								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 <i>Ammur</i>	ogram Ele 3639A / 7 hition	ement (N Fank and f	umber/Na Medium C	ame) Caliber	Project BQ4 / 1	55mm An	r/Name) tillery Prop	oulsion X	M654
Management Service	es (\$ in M	lillions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		-		0.150	Oct 2019	-		0.150	0.000	0.150	-
	1	Subtotal	-	-		-		0.150		-		0.150	0.000	0.150	N/A
Remarks Program Management inclu Product Development	udes Super	charge travel and milest	one docum	entation sup	oport.			FY 2	2020	FY	2020	FY 2020			
				FY 2	2018	FY 2	2019	Ba	se	0	CO	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
Supercharge Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		-		1.339	Oct 2019	-		1.339	0.000	1.339	-
Developmental Projectile/ Fuze Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		-		1.030	Oct 2019	-		1.030	0.000	1.030	-
		Subtotal	-	-		-		2.369		-		2.369	0.000	2.369	N/A
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY	2020 CO	FY 2020 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	Armament Research Development Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		4.281	Oct 2019	-		4.281	0.000	4.281	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Fank and I	umber/Na Medium C	ame) Caliber	Project BQ4 / 1	(Numbei 55mm An	r/Name) tillery Prop	oulsion X	M654
Support (\$ in Million	is)			FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY : O	2020 CO	FY 2020 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	-	-		-		4.281		-		4.281	0.000	4.281	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY : O	2020 CO	FY 2020 Total			
Cost Catagory Itom	n (\$ in Millions) Contract Method Performing Prio			Cost	Award	Coot	Award	Gaat	Award	Cost	Award	Total	Cost To	Total	Target Value of
Supercharge Prototype Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-	Dale	-	Date	0.400	Oct 2019	-	Date	0.400	0.000	0.400	-
	- L	Subtotal	-	-		-		0.400		-		0.400	0.000	0.400	N/A
Prio Year				FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		7.200		-		7.200	0.000	7.200	N/A
									1				·I		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020																Da	te: N	<i>l</i> arc	h 20	19								
Appropriation/Budget Activity 2040 / 4				R-1 PE 0 <i>Amn</i>	Prog 6036 nunit	g ram 639A tion	1 Ele	emen Tank a	and N	umb Aedi	er/N ium	lame Calik	e) Der	Р В	roje Q4 /	ect (N 155	Num 5mm	ber/ Artil	Nam lery	i e) Prop	oulsio	n XI	<i>1</i> 654	4				
Firent Name		FY	201	8		FY	201	19		FY	202	20		FY	202	1		FY	202	22		FY	202	3		FY	2024	Ļ
Event Name	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
Supercharge Prototyping									Protot	typing																		
Supercharge Prototype Testing										esting																		
										_																		
									•																			1

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date:	March 2019
ppropriation/Budget Activity 040 / 4	R-1 Program Element (Numbe PE 0603639A <i>I Tank and Mediu</i> <i>Ammunition</i>	r/Name) m Caliber	Project (Number BQ4 / 155mm Art	/ Name) Illery Propulsion XM654
	Schedule Details			
	St	art		End
Events	Quarter	Year	Quarter	Year
Supercharge Prototyping	1	2020	4	2020
Supercharge Prototype Testing	1	2020	4	2020

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 39A / Tank a n	t (Number/ and Medium	Name) Caliber	Project (N EB8 / OWL	umber/Nan . for Small (1e) Caliber Amm	nunition
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EB8: OWL for Small Caliber Ammunition	-	4.097	2.174	2.000	-	2.000	0.000	0.000	0.000	0.000	0.000	8.271
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

The small caliber One Way Luminescence (OWL) technology applies to multiple calibers. In FY 2019, Budget Activity 4 (BA4) Program Element (PE) 0603639A, Project EB8, 7.62mm OWL transitions to Budget Activity 5 (BA5) PE 0604802A, Project EP4, 7.62mm OWL. In FY 2021, BA4 PE 0603639A, Project EB8, 5.56mm OWL transitions to BA5 PE 0604802A, Project EP4, 5.56mm OWL

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 and 5.56mm are the immediate focus followed by a similar development strategy for .50 caliber cartridges. FY 2020 funding supports continued testing and evaluation of the 5.56mm OWL prototype solutions in order to mature the Technology Readiness Level (TRL).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Technology Maturation and Risk Reduction (TMRR)	4.097	2.104	2.000
Description: One Way Luminescence (OWL) will develop and demonstrate a full day/night tracer technology that eliminates the shortcomings of current legacy tracers.			
FY 2019 Plans: 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 exploring implementation of OWL technology in .50 Caliber and other small caliber ammunition.			
FY 2020 Plans: FY 2020 efforts will continue activities to mature 5.56mm Technology Readiness Level (TRL). Plans include testing 5.56mm prototype solutions in preparation for TRL 6. Evaluate .50 Caliber and other small caliber ammunition OWL technology/prototype ammunition and mature TRLs.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justif	fication: PB	2020 Army							Date: M	arch 2019	
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Ammu</i>	r ogram Eler 03639A / <i>Ta</i> inition	nent (Numb nk and Medi	er/Name) um Caliber	Projec EB8 /	t (Number/N OWL for Sma	lame) all Caliber Am	munition
B. Accomplishments/Planned Prog	<u>ırams (\$ in N</u>	<u>/lillions)</u>						Γ	FY 2018	FY 2019	FY 2020
Technology maturation of the 5.56mr 5.56mm and other small caliber OWL	n OWL starte technology.	ed in FY 201	8. The FY 2	020 funding	furthers the	planned dev	elopment of t	he			
Title: FY 2019 SBIR / STTR Transfer	r								-	0.070	-
FY 2019 Plans: FY 2019 SBIR / STTR Transfer											
FY 2019 to FY 2020 Increase/Decre FY 2019 SBIR / STTR Transfer	ease Statem	ent:									
				Accon	nplishment	s/Planned P	rograms Sul	btotals	4.097	2.174	2.000
C. Other Program Funding Summa	ry (\$ in Milli	ons)									
l inc Itom	EV 2019	EV 2010	FY 2020	FY 2020	FY 2020	EV 2024	EV 2022	EV 202	2 EV 202	<u>Cost To</u>	Total Coat
• EP4: One-Way Luminescence for Small Caliber Ammo	<u>- 1 2010</u> -	6.077	8.547	<u>000</u> -	<u>101a1</u> 8.547	12.391	5.387	6.50	0 3.00	0.000	41.902
Remarks											

Budget Activity 5 (BA5) Program Element (PE) 0604802A, Project EP4

D. Acquisition Strategy

The One Way Luminescence (OWL) technology will be integrated into the M80A1 trace ammunition production. 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 and FY 2018 TRAs were conducted to evaluate the Industry and Government concepts in order to proceed with the 7.62mm Engineering and Manufacturing Development (EMD) in FY 2019. The 5.56mm and .50 caliber cartridges will follow the 7.62mm schedule with Engineering and Manufacturing Development (EMD) scheduled to commence in FY 2021 for the 5.56mm variant. The new 5.56mm tracer cartridges will replace the legacy 5.56mm M856A1 tracer.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	roject C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Fank and	umber/N Medium C	ame) Caliber	Project EB8 / C	(Number WL for Si	r/Name) mall Calib	er Ammu	inition
Product Developmen	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Program Manager Maneuver Ammunition Systems (PM MAS) : Picatinny. NJ	0.370	0.022	Oct 2017	-		-		-		-	0.600	0.992	-
Physical Optics Corporation	C/FFP	Physical Optics Corporation : Torrance, CA	1.080	-		-		-		-		-	0.000	1.080	-
Battelle Memorial Institute	C/FFP	Battelle Memorial Institute : Columbus, OH	0.716	-		-		-		-		-	0.000	0.716	-
Tooling	Option/ FFP	SAVIT Corporation : Rockaway, NJ	0.209	0.392	Oct 2017	-		-		-		-	0.000	0.601	-
Tooling Development	Option/ CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	-		0.800	Feb 2019	0.250	Feb 2020	-		0.250	0.000	1.050	Continuing
Prototype Development Contract 1	Option/ CPFF	General Dynamics : Florham Park, NJ	-	0.515	Jul 2018	-		0.400	Feb 2020	-		0.400	0.000	0.915	Continuing
Prototype Development Contract 2	Option/ CPFF	Nammo Tally : Mesa, AZ	-	0.515	Jul 2018	-		0.400	Feb 2020	-		0.400	0.000	0.915	Continuing
Projectile Development	MIPR	Armament Research Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.125	Oct 2017	-		-		-		-	0.000	0.125	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.070		-		-		-	0.000	0.070	-
		Subtotal	2.375	1.569		0.870		1.050		-		1.050	0.600	6.464	N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Tank and I	umber/N Medium (ame) Caliber	Project EB8 / C	(Number WL for Si	r/ Name) mall Calib	er Ammu	nition
Support (\$ in Million	s)		ſ	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	3.269	2.203	Oct 2017	1.254	Oct 2018	0.575	Oct 2019	_		0.575	2.498	9.799	Continuing
		Subtotal	3.269	2.203		1.254		0.575		-		0.575	2.498	9.799	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ase	FY 2	2020 CO	FY 2020 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	Army Research Lab (ARL) : Aberdeen, MD	0.278	-		0.030	Oct 2018	0.040	Oct 2019	-		0.040	1.500	1.848	Continuing
Army Corps of Engineers	MIPR	Army Corps of Engineers : Vicksburg, MO	0.313	0.075	Apr 2018	-		0.035	Oct 2019	-		0.035	1.500	1.923	Continuing
Night Vision Labs (NVL)	MIPR	Night Vision Labs (NVL) : Fort Belvoir, VA	0.040	-		-		-		-		-	0.000	0.040	-
US Army Aberdeen Test Center (ATC)	MIPR	US Army Aberdeen Test Center (ATC) : Aberdeen, MD	0.101	-		-		-		-		-	0.000	0.101	-
Army Joint Munitions Command	MIPR	Army Joint Munitions Command : Rock Island, IL	0.154	0.050	Oct 2017	0.020	Oct 2018	0.050	Oct 2019	-		0.050	0.000	0.274	-
Naval Air Warfare Center	MIPR	Naval Air Warfare Center : Patuxent River, MD	0.137	-		-		-		-		-	0.000	0.137	-
Prototype testing	Option/ FFP	Double B Enterprises : Malvern, IA	-	0.200	Jan 2018	-		0.250	Feb 2020	-		0.250	0.000	0.450	Continuing
	·	Subtotal	1.023	0.325		0.050		0.375		-		0.375	3.000	4.773	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	020 Army	/					Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4			R-1 Program E PE 0603639A / Ammunition	lement (Number/N Tank and Medium	lame) Caliber	Project (EB8 / OV	Number VL for Sr	r/ Name) mall Calibo	er Ammu	nition
	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2 OC	020 :O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.667	4.097	2.174	2.000	-		2.000	6.098	21.036	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 /	Arm	ıy																		Dat	e: M	arch	201	9			
Appropriation/Budget Activity 2040 / 4								R-1 F PE 0 <i>Amm</i>	Prog 6036 nuniti	jram 639/ ion	Elei A / Ta	men ank a	i t (N u and N	imbe ⁄lediu	r/Nan m Cal	ibe r	P E	rojeo B8 /	ct (N OWI	umb L for	oer/N Sma	lame all Ca	e) alibe	r Am	mun	ition	
									_				-														
Event Name		F	Y 2	018		FY	201	19		FY	202	0		FY 2	021		FY	202	2		FY :	2023			FY 2	024	
7.62mm Multiple Concept Design Evaluation	1		2	3 4	1	2	3	4	1	2	3	4	1	2	3 4	1	2	3	4	1	2	3	4	1	2	3	4
7.62mm Milestone B (MS-B)	7.0	2mm i	viuitip	e Concep	7.62m	m Eva	-B	1																			
7.62mm Transitions from BA04 EB8 to BA05 EP4				7.6	2mm B	A04 to	BA05	5 Transit	ion																		
7.62mm Engineering and Manufacturing Development (EMD)					7.6	2mm E	EMD																				
7.62mm Design Verification Test						7.6	2mm [оvт																			
7.62mm Preliminary Design Review (PDR)							7.6	2mm PE	DR.																		
7.62mm User Assessment								7.62m	m Use	r Asse	ssment																
7.62mm Pre-Production Qualification Test (PPQT)								7.62m	m PPC	ΩТ																	
7.62mm Critical Design Review (CDR)										6 7.62	mm CD	R															
7.62mm Development Test & Evaluation (DT&E)											7.62m	m DT8	E														
7.62mm Production Qualification Test (PQT)											I	7.62m	m PQT														
7.62mm Live Fire Test and Evaluation (LFT&E)											I	7.62m	m LFTá	έ													
7.62mm Milestone C															7.62	nm MS-	с										



Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٩rm	/																				Da	te:	Mar	ch 2	019			
Appropriation/Budget Activity 2040 / 4								R-1 F PE 0 <i>Amm</i>	Prog 6036 nuniti	i ram 639A ion	Ele \ / Ta	men ank a	it (N and	lum Mea	ber diur	r/Na n Ca	me) alibe	er	P I El	roje B8 /	ect (N OW	lum /L foi	ber r Sn	/ Na i nall	ne) Calik	ber A	Amm	uniti	ion
E		FY	(20 ⁻	18		FY	201	19		FY	202	0		F١	Y 20	021			FY	202	22		FY	(20	23		F١	(20	24
	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 Production Qualification Testing (PQT)																									5.56	ōmm P	Ωт		
5.56mm Live-Fire Test and Evaluation (LFT&E)																									5.56	ōmm Li	-T&E		
5.56mm Milestone C (MS-C)																												ŧ	13 5.56mm I
.50 caliber Concept Design Evaluation									.50	caliber	Conce	ept Des	ign E	valua	tion														
													L				I					1							

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		·		Date: Mar	rch 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program E PE 0603639A / Ammunition	lement (Numbo Tank and Media	e r/Name) um Caliber	Project (Number/Na EB8 / OWL for Small	me) Caliber Ammunition
	Schedule Details				
	Γ	S	tart	E	End
Events		Quarter	Year	Quarter	Year
7.62mm Multiple Concept Design Evaluation		1	2015	1	2019
7.62mm Milestone B (MS-B)		1	2019	1	2019
7.62mm Transitions from BA04 EB8 to BA05 EP4		1	2019	1	2019
7.62mm Engineering and Manufacturing Development (EMD)		1	2019	3	2021
7.62mm Design Verification Test		2	2019	3	2019
7.62mm Preliminary Design Review (PDR)		3	2019	3	2019
7.62mm User Assessment		4	2019	1	2020
7.62mm Pre-Production Qualification Test (PPQT)		4	2019	2	2020
7.62mm Critical Design Review (CDR)		2	2020	2	2020
7.62mm Development Test & Evaluation (DT&E)		3	2020	4	2020
7.62mm Production Qualification Test (PQT)		4	2020	1	2021
7.62mm Live Fire Test and Evaluation (LFT&E)		4	2020	3	2021
7.62mm Milestone C		4	2021	4	2021
5.56mm Materiel Development Decision (MDD)		3	2018	3	2018
5.56mm Project Starts on BA04 EB8		3	2018	3	2018
5.56mm Multiple Concept Design Evaluation		4	2018	4	2020
5.56 Cavity Design Test		1	2020	3	2020
5.56 Technology Readiness Level 6		4	2020	4	2020
5.56mm Milestone B (MS-B)		1	2021	1	2021
5.56mm Transitions from BA04 EB8 to BA05 EP4		1	2021	1	2021
5.56mm Engineering and Manufacturing Development (EMD)		1	2021	3	2024
5.56mm Design Verification Test		4	2021	4	2021

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mai	rch 2019
oppropriation/Budget Activity 040 / 4	R-1 Program PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	r/Name) m Caliber	Project (Number/Na EB8 / OWL for Small	me) Caliber Ammunition
		St	art	E	End
Events		Quarter	Year	Quarter	Year
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
5.56mm Production Qualification Testing (PQT)		4	2023	1	2024
5.56mm Live-Fire Test and Evaluation (LFT&E)		4	2023	1	2024
5.56mm Milestone C (MS-C)		4	2024	4	2024
.50 caliber Concept Design Evaluation		1	2020	3	2020

<u>Note</u>

As the technology matures, the One Way Luminescence (OWL) projects transitions from Budget Activity 4 (BA4) PE 0603639A, Project EB8 to Budget Activity 5 (BA5) PE 0604802A, Project EP4.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	a m Element 9A / Tank a n	: (Number /l nd Medium	Name) Caliber	Project (N EB9 / Aviat Counterme	umber/Nan tion Airborn easures	1e) e Expandab	le
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EB9: Aviation Airborne Expandable Countermeasures	-	8.500	2.471	3.186	-	3.186	4.500	6.060	0.000	0.000	0.000	24.717
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports 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 PMs with PM Aircraft Survivability Equipment (ASE) to address emerging Joint Urgent Operational Need Statement (JUONS) CC-0558 Counter - Unmanned Aerial Systems (CUAS). 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 XM215 and RF Countermeasures (CM).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Expendable Countermeasures to Guided Missile Threats	8.500	2.392	3.186
Description: This program will develop expendable countermeasure (CM) decoys which will protect Army aircraft from surface-to-air missiles.			
FY 2019 Plans: Conduct demonstration efforts and flight testing on XM215 Countermeasures (CM) and Radio Frequency (RF) CM based on modeling and simulation efforts. Conduct flight testing for both XM215 and RF Passive countermeasure solutions.			
<i>FY 2020 Plans:</i> Conduct optimization for the XM215 during Technology Maturation & Risk Reduction (TMRR), System Requirements Review (SRR) and flight testing. Continue maturing prototype design and technology and Pre-Engineering and Manufacturing Development (EMD) review. Prepare Initial documentation to support Milestone B for RF Countermeasures. Conduct Pre-EMD review and Preliminary Design Review (PDR) for RF Countermeasures.			
FY 2019 to FY 2020 Increase/Decrease Statement: Funding is increasing commensurate with additional support and analysis required as the program progresses.			
Title: FY 2019 SBIR / STTR Transfer	-	0.079	-

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army							Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4				R-1 P I PE 06 <i>Amm</i> L	rogram Eler 03639A / Ta Inition	nent (Numb nk and Medi	er/Name) um Caliber	Projec EB9 / A Counte	t (Number/N Aviation Airb ermeasures	Vame) orne Expanda	ible
B. Accomplishments/Planned Pro	<u>grams (\$ in N</u>	<u>/lillions)</u>							FY 2018	FY 2019	FY 2020
FY 2019 Plans: FY 2019 SBIR / STTR Transfer											
FY 2019 to FY 2020 Increase/Decr FY 2019 SBIR / STTR Transfer	ease Statem	ent:									
				Accor	nplishment	s/Planned P	rograms Su	btotals	8.500	2.471	3.186
C. Other Program Funding Summ	ary (\$ in Milli	<u>ons)</u>									
			FY 2020	FY 2020	FY 2020					<u>Cost To</u>	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	Base	000	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 202</u>	<u>3 FY 202</u>	4 Complete	Total Cost
 EP7: Aviation Airborne 	-	7.213	4.920	-	4.920	4.480	8.250	-	-	0.000	24.863
Expendable Countermeasures											
<u>Remarks</u>											

D. Acquisition Strategy

A Technical Development Strategy (TDS) for the development and production of Flare, Aircraft: Countermeasure XM215 and Radar Frequency (RF) Decoys under the Aviation Airborne Expendable Countermeasure (AAECM) program for the United States (U.S.) Army will be used. Prototyping contracts will be awarded competitively under the Department of Defense (DoD) Ordnance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) contract mechanism.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	020 Arm	у							_	Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	y				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Tank and	l umber/N a Medium C	ame) Caliber	Project EB9 / A Counter	(Number viation Air measure	r /Name) rborne Ex _l s	pandable	
Management Service	es (\$ in M	lillions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 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	0.455	-		-		-		-		-	0.000	0.455	-
		Subtotal	0.455	-		-		-		-		-	0.000	0.455	N/A
Product Developmen	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 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 XM215 (1)	C/FFP	ACC : Picatinny Arsenal	2.046	0.592	Oct 2018	-		1.450	May 2020	-		1.450	0.000	4.088	-
Prototype Development XM215 (2)	C/FFP	ACC : Picatinny Arsenal	-	0.412	Oct 2018	-		-		-		-	0.000	0.412	-
Prototype Development XM215 (3)	C/FFP	ACC : Picatinny Arsenal	-	0.515	Aug 2018	-		-		-		-	0.000	0.515	-
Prototype Development XM215 (4)	C/FFP	ACC : Picatinny Arsenal	-	0.206	Oct 2018	-		-		-		-	0.000	0.206	-
Prototype Development XM215 (5)	C/FFP	ACC : Picatinny Arsenal	-	0.250	Jan 2019	-		-		-		-	0.000	0.250	-
Prototype Development RF	C/FFP	ACC : Picatinny Arsenal	-	0.773	Sep 2018	1.300	Jun 2019	-		-		-	0.000	2.073	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.079		-		-		-	0.000	0.079	-
		Subtotal	2.046	2.748		1.379		1.450		-		1.450	0.000	7.623	N/A
Support (\$ in Millions	5)			FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 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 XM215	MIPR	ARDEC : Picatinny Arsenal	1.719	0.468	Sep 2018	-		0.280	Dec 2019	-		0.280	0.000	2.467	-

PE 0603639A: *Tank and Medium Caliber Ammunition* Army

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Army	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N ank and	umber/Na Medium C	ame) Caliber	Project EB9 / A Counter	(Number viation Air rmeasure	r/ Name) rborne Ex _l s	pandable	
Support (\$ in Million	s)		ſ	FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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 RF	MIPR	ARDEC : Picatinny Arsenal	-	0.650	Sep 2018	-		0.456	Dec 2019	-		0.456	0.000	1.106	-
HILT T-SPIL	MIPR	TBB : China Lake CA	-	0.300		-		-		-		-	0.000	0.300	-
		Subtotal	1.719	1.418		-		0.736		-		0.736	0.000	3.873	N/A
Test and Evaluation	(\$ in Mill	ions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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
Flight Test and Evaluation XM215	MIPR	TBD : TBD	0.950	1.782	Feb 2019	1.092	Apr 2019	-		-		-	0.000	3.824	-
Modeling & Simulation	MIPR	ARDEC : Picatinny Arsenal	-	1.072	Jun 2018	-		-		-		-	0.000	1.072	-
AOA Development	MIPR	AMSAA : APG, MD	0.261	-		-		-		-		-	0.000	0.261	-
AOA Development	MIPR	TRAC : Ft Leavenworth, KS	0.550	-		-		-		-		-	0.000	0.550	-
Flight Test and Evaluation RF	MIPR	PAX River : PAX River	-	0.705	Jun 2018	-		1.000	Apr 2020	-		1.000	0.000	1.705	-
Modeling & Simulation RF	MIPR	AFRL : AFRL	-	0.550		-		-		-		-	0.000	0.550	-
Modeling & Simulation RF	MIPR	ARDEC : Picatinney Arsenal	-	0.225	Aug 2018	-		-		-		-	0.000	0.225	-
		Subtotal	1.761	4.334		1.092		1.000		-		1.000	0.000	8.187	N/A
			Prior Years	FY	2018	FY :	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	5.981	8.500		2.471		3.186		-		3.186	0.000	20.138	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy																				Dat	te: N	Marc	ch 20)19				
Appropriation/Budget Activity 2040 / 4						R P <i>A</i>	2 -1 P PE 06	r og 8036 uniti	ram 339A on	Ele	emer ank a	nt (N and l	lum Me	iber/ dium	Nan Cal	i e) iber		Pro EB§ Coι	j ect) / A inte	t (N Iviat rme	umt tion easu	oer/ Airk ires	Nan	n e) e Exp	pan	ndab	le		
	F	Y 20	18		FY	2019			FY	202	20		F	Y 20	21		F	Y 2	022			FY	202	23		F	Y 20	24	
Event Name	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	3 4	¢.
Materiel Development Documentation and Decision for XM215																													
Analysis of Alternatives																													
Demonstration Contract Preparation XM215																													
Milestone A XM215				2																									
Demonstration Down Select XM215																													
Prototyping XM215																													
Testing Efforts (Stability/Heat/Cold) XM 215																													
Flight Testing XM 215																													
Milestone B XM215											6																		
Demonstration Contract Preparation RF Countermeasure																													
Milestone A RF Countermeasure				3																									
Contract Award RF Countermeasure			-	1																									
Demonstrations RF Countermeasure																													

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army							Date: March 20	019
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Amm</i>	rogram Elemen 603639A / Tank a unition	nt (Number/Name and Medium Calib	e) Der	Project (N EB9 / Avia Counterme	lumber/Name) ation Airborne Ex easures	pandable
Event Name	FY 2018	FY 20	019	FY 2020	FY 2021	I	FY 2022	FY 2023	FY 2024
Prototype Development RF Countermeasure	1 2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4
Flight Testing RF Countermeasure									
Data Analysis RF Countermeasure									
Milestone B RF Countermeasure				5					

hibit R-4A, RDT&E Schedule Details: PB 2020 Army	Date: March 2019				
propriation/Budget Activity 40 / 4	R-1 Program Element (Numb PE 0603639A / Tank and Med Ammunition	Project (Number/Name) EB9 <i>I Aviation Airborne Expandable</i> <i>Countermeasures</i>			
	Schedule Details				
	5	Start	End		
Events	Quarter	Year	Quarter	Year	
Materiel Development Documentation and Decision for XM215 CM	2	2016	2	2018	
Analysis of Alternatives	3	2017	3	2018	
Demonstration Contract Preparation XM215	4	2018	4	2018	
Milestone A XM215	1	2019	1	2019	
Demonstration Down Select XM215	3	2019	3	2019	
Prototyping XM215	1	2019	2	2020	
Testing Efforts (Stability/Heat/Cold) XM 215	2	2019	4	2020	
Flight Testing XM 215	3	2020	3	2020	
Milestone B XM215	4	2020	4	2020	
Demonstration Contract Preparation RF Countermeasure	4	2018	4	2018	
Milestone A RF Countermeasure	1	2019	1	2019	
Contract Award RF Countermeasure	1	2019	1	2019	
Demonstrations RF Countermeasure	1	2019	2	2019	
Prototype Development RF Countermeasure	3	2019	4	2019	
Flight Testing RF Countermeasure	4	2019	4	2019	
Data Analysis RF Countermeasure	4	2019	3	2020	

Milestone B RF Countermeasure

2020

3

3

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army									Date: March 2019			
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>				Project (Number/Name) EC2 I Adv Armor-Piercing (ADVAP) for Small Cal Ammo				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	0.000	3.755	6.821	-	6.821	0.000	0.000	0.000	0.000	0.000	10.576
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber Advanced Armor-Piercing (ADVAP) technology has been under development since 2015 and applies to multiple calibers of ammunition. In FY 2017, the funding transitioned from Budget Activity (BA) 04 Program Element (PE) 0603639A, Project EC2 to BA 05, PE 0604802A, Project EP5, Adv Armor-Piercing (ADVAP) for Small Cal Ammo to continue the development of ADVAP 7.62mm ammunition. A follow-on effort to support ADVAP ammunition calibers below 7.62mm commences in FY 2019 under the BA 4, PE 0603639A, Project EC2 Adv Armor-Piercing (ADVAP) Small Cal Ammo. In FY 2021, PE 0603639A, Project EC2, ADVAP will be realigned to PE 0604601 Project EV9 prior to the PB 2021 submission to continue development efforts on ADVAP ammunition in calibers below 7.62mm. The effort is not a new start.

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) and the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) which outlines the requirements for new ammunition to support the rapid prototyping/development of the Next Generation Squad Weapons (NGSW) under Section 804 Authority. New ADVAP ammunition is designed to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. The nomenclature for the 7.62mm ADVAP is XM1158.

The Next Generation Squad Weapons (NGSW) ammunition has a similar objective to the 7.62mm ADVAP which is to defeat hard targets. The NGSW ammunition is split into two initial variants, the General Purpose (GP) and the Special Purpose (SP). The nomenclature for the GP ammunition is XM1186 and the nomenclature for the SP ammunition is XM1184. 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.

FY 2020 funding supports continuing rapid prototyping/development of the Next Generation Squad Weapons (NGSW) Special Purpose (SP) projectile, building prototypes and maturing prototypes to provide to the weapon system contractors for performance evaluation, conducting a Critical Design Review (CDR), and conducting prototype testing. FY 2020 funding also supports conducting a Preliminary Design Review (PDR) for the SP projectile and performing activities to increase prototype capacity to support planned weapon system testing.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Small Caliber Ammunition Rapid Prototyping	-	3.634	6.821

Exhibit R-2A, RDT&E Project Just	fication: PB	2020 Army							Date: N	/larch 2019	
Appropriation/Budget Activity 2040 / 4				R-1 P I PE 06 <i>Ammu</i>	rogram Eler 03639A / Ta unition	nent (Numb nk and Medi	er/Name) um Caliber	Projec EC2 / A Small (t (Number/ Adv Armor-F Cal Ammo	Name) Piercing (ADVA	AP) for
B. Accomplishments/Planned Pro	g <u>rams (\$ in I</u>	<u> ////////////////////////////////////</u>							FY 2018	FY 2019	FY 2020
Description: Develop, demonstrate overmatch capability versus a broad	and qualify s spectrum of	small caliber hard targets	ADVAP car	tridges that o	can defeat th	ireat targets	and provide				
FY 2019 Plans: FY 2019 efforts will be focused on raprojectile to include building and eva (TRL), conducting a GP Preliminary Generation Squad Weapon system of	pid prototypi luating projec Design Revie development.	ng/developn ctile prototyp ew (PDR), ai	nent of the G les to refine nd preparing	eneral Purp concepts an for insertion	ose (GP) an d mature the n into the rap	d Special Pu Technology id prototypin	rpose (SP) Readiness g for the Ne	Level xt			
FY 2020 Plans: FY 2020 efforts are focused on cont prototypes to provide to the weapon and conducting prototype testing. A activities to increase prototype capa	nuing rapid p system contr lso, conductir city to suppor	rototyping/d actors for peng a Prelimir t planned we	evelopment erformance e hary Design l eapon syster	of the SP province evaluation, co Review (PDF m testing beg	ojectile, buik onducting a R) for the SF ginning in F`	ding prototyp Critical Desig Pprojectile and 7 2021 and F	es and matu gn Review ((nd performin ?Y 2022.	uring CDR), g			
FY 2019 to FY 2020 Increase/Decr FY 2019 to FY 2020 increase neede	e ase Statem d to fund plar	ent: nned rapid p	rototyping a	ctivities for b	oth the GP a	and SP amm	unition.				
Title: FY 2019 SBIR / STTR Transfe	r								-	0.121	-
FY 2019 Plans: FY 2019 SBIR / STTR Transfer											
FY 2019 to FY 2020 Increase/Decr FY 2019 SBIR / STTR Transfer	ease Statem	ent:									
				Accor	nplishment	s/Planned P	rograms Sເ	ubtotals	-	3.755	6.821
C. Other Program Funding Summa	ary (\$ in Milli	<u>ons)</u>	EV 2020	EV 2020	EV 2020					Cost To	
Line Item	FY 2018	FY 2019	Base	0CO	Total	FY 2021	FY 2022	FY 202	3 FY 202	4 Complete	Total Cost
• EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	13.318	16.748	0.000	-	0.000	-	-	-	<u></u> .	0.000	30.066
• FL4: Small Caliber Ammo for Next Gen Squad Weapons	-	-	22.880	-	22.880	30.630	28.750	25.00	0 11.75	50 0.000	119.010
PE 0603639A: <i>Tank and Medium Ca</i>	liber Ammuni	tion		UNCLAS	SIFIED						94
Exhibit R-2A, RDT&E Project	Justification: PB	2020 Army					Date: March 2019				
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Appropriation/Budget Activity 2040 / 4					r ogram Eler 03639A / Ta Inition	nent (Numb nk and Medi	Project (I EC2 / Adv Small Cal)ject (Number/Name) 2 I Adv Armor-Piercing (ADVAP) for aall Cal Ammo			
C. Other Program Funding Su	mmary (\$ in Milli	<u>ons)</u>									
			FY 2020	FY 2020	FY 2020					Cost To	
Line Item	FY 2018	<u>FY 2019</u>	Base	000	<u>Total</u>	<u>FY 2021</u>	FY 2022	FY 2023	FY 2024	<u>Complete</u>	Total Cost
Demerike											

<u>Remarks</u>

These funding lines support Engineering & Manufacturing Development (EMD) activities for the 7.62mm ADVAP ammunition and rapid prototyping/development of General Purpose (GP) and Special Purpose (SP) ammunition for the Next Generation Squad Weapon (NGSW) systems. Other Program Funding in Budget Activity 05 (BA05) PE 0604802A, Project EP5 and Budget Activity 05 (BA05) PE 0604802A, Project FL4.

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. Follow-on developmental efforts for the ADVAP ammunition calibers below 7.62mm will utilize rapid prototyping acquisition strategy under Section 804 Authority. The project will utilize Government developed projectile designs that will be delivered to development contractors as Government Furnished Material (GFM). The Government will select up to three contractors for the weapon system development and down-select to a single contractor in FY 2021, prior to production contract award.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	019		
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Program Element (Number/Name)PPE 0603639A / Tank and Medium CaliberEAmmunitionS						oject (Number/Name) 22 I Adv Armor-Piercing (ADVAP) for nall Cal Ammo				
Product Developmer	nt (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 FY 2 ase O		2020 CO	FY 2020 Total]			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	0.658	-		-		-		-		-	0.600	1.258	-	
Prototype Manufacturing	C/FFP	Jet Industrial : New Jersey	1.039	-		-		-		-		-	2.600	3.639	-	
Phase 1 Propellant Development	C/FFP	ATK : Virginia	0.141	-		-		-		-		-	0.000	0.141	-	
Projectile Development	Option/ CPFF	Northrop Grumman Innovation Systems : Independence, MO	-	-		2.825	Jan 2019	3.200	Jan 2020	-		3.200	Continuing	Continuing	Continuing	
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.121		-		-		-	0.000	0.121	-	
	1	Subtotal	1.838	-		2.946		3.200		-		3.200	Continuing	Continuing	N/A	
Support (\$ in Million	s)			FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 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	-		0.659	Oct 2018	1.921	Oct 2019	-		1.921	Continuing	Continuing	Continuing	
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	1.000	-		-		1.000	Oct 2019	-		1.000	Continuing	Continuing	Continuing	
		Subtotal	7.387	-		0.659		2.921		-		2.921	Continuing	Continuing	N/A	
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2 Of	2020 CO	FY 2020 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	-		0.150	Oct 2018	0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing	
U.S. Army Aberdeen Test Center	TBD	Aberdeen : Maryland	-	-		-		0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing	

Exhibit R-3, RDT&E	xhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army											Date: March 2019				
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (Number/Name)PE 0603639A I Tank and Medium CaliberEC2 I Adv Armor-PiercingAmmunitionSmall Cal Ammo					(ADVAP)	for				
Test and Evaluation (\$ in Millions)				FY 2018		FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
		Subtotal	3.200	-		0.150		0.700		-		0.700	Continuing	Continuing	N/A	
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals 12.425 -					3.755		6.821		-		6.821	Continuing	Continuing	N/A		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army						Date: March 20	19
Appropriation/Budget Activity 2040 / 4			R-1 Pr PE 060 <i>Ammu</i>	ogram Elemer 03639A / Tank nition	nt (Number/Name and Medium Calil	e) Project (N ber EC2 / Adv Small Cal	lumber/Name) Armor-Piercing (Ammo	ADVAP) for
EventNeme	FY 2018	FY 20)19	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Event Name	1 2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
NGSW Ammo Rapid Prototyping		NGSW Ammo R	P					
NGSW Ammo Initital Product Review 1 (IPR 1) Special Purpose		NGSW Amm	io IPR 1 SP					
NGSW Ammo Preliminary Design Review General Purpose (PD	R-GP)	NG	2 SW Ammo B	PDR-GP				
NGSW Ammo Initital Product Review 2 (IPR 2) Special Purpose			NGSW Am	mo IPR 2 SP				
NGSW Ammo Preliminary Design Review Special Purpose (PD	R-SP)			NGSW Ammo PDR-	sP			
NGSW Ammo Critical Design Review General Purpose (CDR-G	P)			5 NGSW Ammo	CDR-GP			
NGSW Ammo Prototype Test 1				NGSW Ar	mmo PT1			
NGSW Ammo Initital Product Review 3 (IPR 3) Special Purpose				A NGSW	Ammo IPR 3 SP			
NGSW Ammo Full Materiel Release (FMR) Transitions from BAC	4 EC2 to BA05 FL4			л	SSW Ammo FMR BA04 to	BA05 Transition		
NGSW Ammo Critical Design Review Special Purpose (CDR-SF)				NGSW Ammo CDR-S	P		
NGSW Ammo Prototype Test 2					NGSW Ammo P	2		
NGSW Ammo Urgent Materiel Release General Purpose (UMR	GP)					9 NGSW	Ammo UMR GP	
NGSW Ammo Urgent Materiel Release Special Purpose (UMR S	P)						Ammo UMR SP	

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy								Date: March 20	19	
Appropriation/Budget Activity 2040 / 4				R-1 PE (<i>Ami</i>	Program Eleme 0603639A / Tank munition	ent (Number/Nam and Medium Cali	e) F ber E	Project (N EC2 I Adv Small Cal	Number/Name) v Armor-Piercing (ADVAP) for I Ammo		
			1				1		1		
Event Name	FY 2018		FY 2	2019	FY 2020	FY 2021	F \	Y 2022	FY 2023	FY 2024	
NGSW Ammo Rapid Fielding	<u> </u>	2 3 4	1 2	5 4	1 2 3 4		1 2	<u> </u>	I Z J 4	1 2 3 4	
NGSW Ammo Production Qualification Testing Special Purpose	(PQT SI	^{>})							NGSW Ammo PQT SP		
NGSW Ammo Full Materiel Release (FMR)										NGSW Ammo FMR	

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Marc	ch 2019	
ppropriation/Budget Activity 040 / 4	R-1 Program Element (Numbe PE 0603639A <i>I Tank and Mediu</i> <i>Ammunition</i>	er/Name) Im Caliber	Project (Number/Nan EC2 / Adv Armor-Piero Small Cal Ammo	ne) cing (ADVAP) for	
	Schedule Details				
	St	art	End		
Events	Quarter	Year	Quarter	Year	
NGSW Ammo Rapid Prototyping	1	2019	2	2024	
NGSW Ammo Initital Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019	
NGSW Ammo Preliminary Design Review General Purpose (PDR-0	GP) 3	2019	3	2019	
NGSW Ammo Initital Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019	
NGSW Ammo Preliminary Design Review Special Purpose (PDR-S	P) 2	2020	2	2020	
NGSW Ammo Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020	
NGSW Ammo Prototype Test 1	3	2020	4	2020	

	<u> </u>	2020	<u> </u>	2020
NGSW Ammo Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
NGSW Ammo Prototype Test 1	3	2020	4	2020
NGSW Ammo Initital Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
NGSW Ammo Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4	2	2021	2	2021
NGSW Ammo Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
NGSW Ammo Prototype Test 2	2	2021	3	2021
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
NGSW Ammo Rapid Fielding	4	2022	1	2026
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)	1	2023	2	2023
NGSW Ammo Full Materiel Release (FMR)	2	2024	2	2024

Exhibit R-2A, RDT&E Project Ju	nibit R-2A, RDT&E Project Justification: PB 2020 Army											
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 89A / Tank a n	t (Number/ and Medium	/Name) Project (Number/Name) n Caliber EC3 I Ammunition Logistics Prototypi				typing
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EC3: Ammunition Logistics Prototyping	-	1.677	1.313	1.525	-	1.525	1.715	2.170	1.800	1.836	0.000	12.036
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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 2020 funding will be used to complete verification testing and an operational demonstration for the environmental health monitoring system. FY 2020 funding will also be used to continue verification testing of a type two prototype next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Munitions Health and Inventory Monitoring Systems	1.177	0.856	1.025
Description: Performance and reliability of certain munitions can be degraded by the environmental exposure history they experience during 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 2019 Plans: 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.			
<i>FY 2020 Plans:</i> Conduct an extended operational demonstration of the environmental health monitoring system to enable condition based management of ammunition. Continue verification testing of a type II prototype next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities for the assessment of munition reliability and complete an operational demonstration of the type I prototype. Complete operational demonstration of the low cost thermal indicator, which provides passive lifetime temperature exposure sensing.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	<pre>oject (Number/Name) C3 / Ammunition Logistics Prototyping</pre>			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020	
FY 2020 funding is slightly higher than FY 2019 due to an anticipated	increase in labor and material costs.				
Title: Munitions Containerization Systems		0.500	0.415	0.500	
Description: For each family of munitions containers, optimize protot combat unit load quantity, sustainability/recyclability, Insensitive Munit reconfiguration, unitization, and standardized interfaces. This will impenvironmental and operational impacts.	ype container systems for automation compatibility, tions/explosives safety, environmental protection, load prove ammunition distribution efficiency while minimizing				
FY 2019 Plans: Perform design verification prototype testing and award contract to preparation for qualification testing with 5.56 mm ammunition.	oduce production representative polymer containers in				
FY 2020 Plans: Perform qualification testing of production representative rectangular Perform advanced development and prototype demonstration of the p environment.	polymer container for family of 5.56 mm ammunition. lastic cylindrical container in a realistic operating				
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding is slightly higher than FY 2019 due to anticipated inc	reases in labor and material costs.				
Title: FY2019 SBIR/STTR Transfer		-	0.042	-	
Description: FY 2019 SBIR/STTR Transfer					
<i>FY 2019 Plans:</i> FY 2019 SBIR/STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR Transfer					
	Accomplishments/Planned Programs Subto	tals 1.677	1.313	1.525	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i>	Project (N EC3 / Amm	umber/Name) nunition Logistics Prototyping
	Ammunition		

D. Acquisition Strategy

Munitions Health Monitoring and Munitions Containerization systems will be developed through government and industry prototype efforts. In FY 2020, a Technology Readiness Assessment will be conducted to measure the progress of the designs.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Ammun	gram Ele 3639A / T ition	ement (N ank and	umber/Na Medium C	a me) Caliber	Project EC3 / A	(Numbe mmunitio	r/ Name) n Logistics	s Prototy	bing
Product Developmer	nt (\$ in M	illions)		FY	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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/FFP	Innosense : Torrance, CA	1.630	0.509		0.200		0.200	Dec 2019	-		0.200	0.000	2.539	-
Contract - RRAPDS	C/FFP	Phase IV : Boulder, CO	1.053	0.099	Sep 2018	0.400	Jun 2019	-		-		-	0.000	1.552	-
Contract-Plastic Cylindrical Container	C/FFP	SAVIT : Rockaway, NJ	0.550	0.097	Sep 2018	0.150		0.275	Mar 2020	-		0.275	0.000	1.072	-
Contract-Insensitve Munitions	C/TBD	TBD : TBD	0.576	-		-		-		-		-	0.000	0.576	-
Next Generation Temperature Humidity Indicator	C/FFP	AGM : Tuscon, AZ	0.200	0.206	May 2018	0.050		0.400	Dec 2019	-		0.400	0.000	0.856	-
		Subtotal	4.009	0.911		0.800		0.875		-		0.875	0.000	6.595	N/A
Support (\$ in Millions)			FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	FY 2020 Total]			
Cost Category Item	Contract Method & Type	Performing	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To	Total Cost	Target Value of Contract
ARDEC	MIPR	Picatinny Arsenal :	2.827	0.766	May 2018	0.513	Dec 2018	0.400	Dec 2019	-	Duto	0.400	0.000	4.506	-
		Subtotal	2.827	0.766		0.513		0.400		-		0.400	0.000	4.506	N/A
Test and Evaluation	(\$ in Milli	ons)	[FY	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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	-		-		0.250	Mar 2020	-		0.250	0.000	0.400	-
		Subtotal	0.236	-		-		0.250		-		0.250	0.000	0.486	N/A
PE 0603639A: Tank and Medium Caliber Ammunition				UN				~	1 1 1 1	77				104	
Army					1	- aye 40 (า อว		R	- i Line #	11		-		

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	020 Army	/						Date: March 2019			
Appropriation/Budget Activity 2040 / 4	R-1 Program El PE 0603639A / Ammunition	Project (Number/Name) EC3 <i>I Ammunition Logistics Prototyping</i>									
Prior Years FY 2018				FY 2019	FY 202 Base	20 FY 20 9 OC	020 O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		1.313	1.525	-		1.525	0.000	11.587	N/A		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy					Date: March 20	19	
Appropriation/Budget Activity 2040 / 4		R F A	P-1 Program Elemer PE 0603639A / Tank a Immunition	er EC3 / Am	(Number/Name) nmunition Logistics Prototyping			
Γ				1				
Event Name	FY 2018	FY 2019	FY 2020 4 1 2 3 4	FY 2021	FY 2022	FY 2023	FY 2024	
Advanced Concept Development-Munitions Health Monitoring-1	RRAPDS-Phase 1							
Advanced Concept Development-Munitions Health Monitoring-1	A			RRAPDS-Phase 2				
Advanced Concept Development-Munitions Health Monitoring-2	Low Cost Thermal Indicat	br						
Advanced Concept Development-Munitions Containerization-1	Mur	itions Containerizati	on-Plastic Cylindrical Container					
Advanced Concept Development-Munitions Containerization-1A			Munitions Containerizatio	n-Plastic Rectangular Contair	ner			
Advanced Concept Development-Munitions Health Monitoring-3								
	Next Generation Tempera	ture/Humidity Senso						
			1					

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army	Date: March 2019		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N EC3 / Amr	umber/Name) nunition Logistics Prototyping

Schedule Details

	St	art	End		
Events	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	2018	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	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 39A / Tank a n	t (Number/ and Medium	Name) Caliber	Project (N EL7 / Redu	umber/Nan uced Range	ne) Ammunitior	ז
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EL7: Reduced Range Ammunition	-	3.429	7.609	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.038
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 transitions to PE 0604802A, Project EP3, Reduced Range Ammunition - Small Caliber. In FY 2020, the .50 Caliber variant will transition from 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. There is no funding requested in FY 2020.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Technology Maturation and Risk Reduction (TMRR)	3.429	7.331	-
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 gunners.			
<i>FY 2019 Plans:</i> 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 activities for Preliminary Design Review (PDR), preparing documentation for the .50 Milestone B, and preparing contract documentation for the Engineering and Manufacturing Development (EMD) contract.			
FY 2019 to FY 2020 Increase/Decrease Statement: Effort transitions from Program Element (PE) 0603639A, Project EL7 to PE 0604802A, Project EP3 in FY 2020.			
Title: FY 2019 SBIR / STTR Transfer	-	0.278	-
FY 2019 Plans:			

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army					Date: N	Date: March 2019			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)ProjPE 0603639A / Tank and Medium CaliberEL7Ammunition					Project (Number/Name) L7 I Reduced Range Ammunition					
B. Accomplishments/Planned Pro FY 2019 SBIR / STTR Transfer	grams (\$ in I	<u> Willions)</u>							FY 2018	FY 2019	FY 2020
FY 2019 to FY 2020 Increase/Deci FY 2019 SBIR / STTR Transfer	rease Statem	ent:									
				Accon	nplishments	s/Planned P	rograms Su	btotals	3.429	7.609	-
C. Other Program Funding Summ	ary (\$ in Milli	ions)	<u>FY 2020</u>	FY 2020	FY 2020					<u>Cost To</u>	
Line Item • EP3: Reduced Range Ammunition - Small Caliber	<u>FY 2018</u> -	<u>FY 2019</u> 2.470	<u>Base</u> 8.376	<u>0C0</u> -	<u>Total</u> 8.376	<u>FY 2021</u> 15.000	<u>FY 2022</u> 15.250	<u>FY 2023</u> 13.200	<u>FY 202</u> -	<u>4</u> <u>Complete</u> 0.000	<u>Total Cost</u> 54.296

<u>Remarks</u>

The 7.62mm effort under Budget Activity 04 Element (PE) 0603639A, Project EL7, Reduced Range Ammunition (RRA), transitions in FY 2019 to Budget Activity 05 PE 0604802A, Project EP3. PE 0604802A, Project EP3, RRA funding continues the development work of 7.62mm and supports Engineering and Manufacturing Development (EMD) beginning in FY 2019. The funding line also continues development work on the .50 Caliber variant which transitions from PE 0603639A, Project EL7 to PE 0604802A, Project EP3 in FY 2020.

D. Acquisition Strategy

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

E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N ank and	umber/N Medium (ame) Caliber	Project EL7 / R	(Numbe educed R	r/Name) Range Amr	munition	
Product Developmer	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	0.060	0.160	Oct 2017	-		-		-		-	0.000	0.220	-
Prototype	C/FFP	PTI : Clifton, NJ	0.157	-		-		-		-		-	0.000	0.157	-
Hardware	C/Various	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, New Jersey	0.112	-		-		-		-		-	0.000	0.112	-
Prototype Development	Option/ FFP	Booz Allen Hamilton : Dover, NJ	-	0.312	Dec 2017	-		-		-		-	0.000	0.312	-
Development Contract # 1	C/FFP	To Be Determined : To Be Determined	-	-		1.500	Jan 2019	-		-		-	0.000	1.500	-
Development Contract # 2	C/FFP	To Be Determined : To Be Determined	-	-		1.500	Jan 2019	-		-		-	0.000	1.500	-
Development Contract # 3	C/FFP	To Be Determined : To Be Determined	-	-		1.500	Jan 2019	-		-		-	0.000	1.500	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.278		-		-		-	0.000	0.278	-
		Subtotal	0.329	0.472		4.778		-		-		-	0.000	5.579	N/A
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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	2.467	Oct 2017	1.631	Oct 2018	-		-		-	0.000	4.764	-
Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	0.180	0.250	Mar 2018	0.800	Oct 2018	-		-		-	0.000	1.230	-
		Subtotal	0.846	2.717		2.431		-		-		-	0.000	5.994	N/A

PE 0603639A: *Tank and Medium Caliber Ammunition* Army

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date:	March 20	19	
Appropriation/Budge 2040 / 4	ppropriation/Budget Activity 040 / 4							R-1 Program Element (Number/Name)Project (IPE 0603639A / Tank and Medium CaliberEL7 / RedAmmunitionEL7 / Red					r/ Name) ange Amn	nunition	
Test and Evaluation	(\$ in Milli	ons)	ſ	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO)20 FY 2020 O 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	0.188	Jun 2018	0.200	Oct 2018	-		-		-	0.000	0.527	-
Engineering Tests	MIPR	US Army Test Center (ATC) : Yuma, AZ	-	-		0.200	Oct 2018	-		-		-	0.000	0.200	-
Prototype testing	C/FFP	Double B Enterprises : Malvern, OH	-	0.052	May 2018	-		-		-		-	0.000	0.052	-
		Subtotal	0.139	0.240		0.400		-		-		-	0.000	0.779	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	020 se	FY 2 OC	020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals 1.314						7.609		-		-		-	0.000	12.352	N/A

Remarks





Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019		
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603639A Ammunition	Element (Number I Tank and Media	e r/Name) um Caliber	Project (Number/Name) EL7 I Reduced Range Ammunition			
	Schedule Detail	S					
		S	tart	E	ind		
Events		Quarter	Year	Quarter	Year		
7.62mm Multiple Concept Design Evaluations		1	2017	4	2018		
7.62mm Design Verification Test (DVT)		2	2018	3	2018		
7.62mm Milestone B (MS B)		1	2019	1	2019		
7.62mm Transitions from BA04 EL7 to BA05 EP3		1	2019	1	2019		
7.62mm Engineering and Manufacturing Development (EMD)		1	2019	2	2022		
7.62mm Preliminary Design Review (PDR)		4	2019	4	2019		
7.62mm Pre-Production Qualification Test (PPQT)		2	2020	4	2020		
7.62mm Developmental Test and Evaluation (DT&E)		4	2020	1	2021		
7.62mm Critical Design Review (CDR)		2	2021	2	2021		
7.62mm Production Qualification Test (PQT)		4	2021	2	2022		
7.62mm Milestone C (MS C)		2	2022	2	2022		
.50 Caliber Project Starts on BA04 EL7		1	2018	1	2018		
.50 Caliber Multiple Concept Design Evaluations		1	2018	1	2020		
.50 Caliber Materiel Development Decision (MDD)		2	2018	2	2018		
.50 Caliber Design Verification Test (DVT)		2	2019	3	2019		
.50 Caliber Milestone B (MS B)		1	2020	1	2020		
.50 Caliber Transitions from BA04 EL7 to BA05 EP3		1	2020	1	2020		
.50 Caliber Engineering and Manufacturing Development (EMD)		1	2020	2	2023		
.50 Caliber Preliminary Design Review (PDR)		4	2020	4	2020		
.50 Caliber Pre-Production Qualification Test (PPQT)		4	2020	2	2021		
.50 Caliber Critical Design Review (CDR)		4	2021	4	2021		
.50 Caliber Production Qualification Test (PQT)		1	2022	3	2022		

Exh	ibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	h 2019	
App 204	oropriation/Budget Activity 0 / 4	R-1 Program PE 0603639A <i>Ammunition</i>	Element (Number I Tank and Mediun	/ Name) n Caliber	Project (Number/Name) EL7 I Reduced Range Ammunition		
			Sta	rt	En	d	
	Events		Quarter	Year	Quarter	Year	
	.50 Caliber Milestone C (MS C)		2	2023	2	2023	

Note

As the technology matures, the Reduced Range Ammunition (RRA) projects transition from Budget Activity 04 (BA04) PE 0603639A, Project EL7 to Budget Activity 05 (BA05) PE 0604802A, Project EP3.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Prog PE 06036 Ammuniti	ram Elemer 339A / Tank on	nt (Number and Medium	/Name) n Caliber	Project (I EL8 / LIG FOR SMA	Number/Na HTWEIGHT ALL CALIBE	I me) T CARTRID ER	GE CASE
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EL8: LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER	-	2.870	0.000	0.000	-	0.000	0.000	0.000	0.00	0.00	0 0.000	2.870
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud The Lightweight Small Caliber Ar (CDD). The goal of the LSCA Pro cartridges that will provide the sa weapon systems, but optimized to	l get Item J nmunition (oject is to re me capabil o work in th	ustification LSCA) Proje educe the to ities as the I e M240 Ma	ect is a crition otal Soldier M80A1 and chine Gun.	cal technolo load throug M62A1 cai No funding	ogy develo h reductior tridges. T g requested	oment in res n in ammunit he LSCA ca d in FY 2020	ponse to the tion weight. rtridge will b).	e 7.62mm C The LSCA e designed	Capabilities Project wil to be com	Developme I develop an patible with	ent Docume nd field 7.62 all Army 7.6	nts 2mm LSCA 52mm
B. Accomplishments/Planned P	rograms (in Million	s <u>)</u>						F	Y 2018	FY 2019	FY 2020
Title: 7.62mm Technology Matura	ation & Risk	Reduction	(TMRR) for	r Lightweigł	nt Small Ca	aliber Ammu	nition (LSC/	4)		2.870	-	-
Description: Develop, demonstration provide 10 to 50% ammunition we	ate, and qua	alify a Lightv js.	weight Sma	ll Caliber A	mmunition	(LSCA) 7.62	2mm capabi	lity that will				
					Accompl	ishments/P	lanned Pro	grams Sub	totals	2.870	-	-
C. Other Program Funding Sum	mary (\$ in	<u>Millions)</u>	<u>FY</u> :	<u>2020 FY</u>	<u>2020</u> F	Y 2020					<u>Cost To</u>	
Line Item	<u>FY 20</u>	018 FY 2	<u>019</u>	Base	<u>000</u>	<u>Total</u> <u>F</u>	<u>Y 2021</u>	FY 2022	FY 2023	FY 2024	<u>Complete</u>	Total Cost
• ERO. Direct Fire Technology	0.0	DD4 12.	591 C	0.020	-	0.020	5.729	0.392	0.413	2.909	Continuing	Continuing
The funding lines continue work of FY 2019.	on the 7.62	mm ammun	ition which	transitions t	to Budget <i>i</i>	Activity 07, F	Program Ele	ment 06071	31A, Proje	ect ER6, Dir	ect Fire Tec	hnology in
PF 0603639A: Tank and Medium	Caliber Am	munition		UN	CLASSI	FIED						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i>	Project (N EL8 / LIGH	umber/Name) ITWEIGHT CARTRIDGE CASE
	Ammunition	FOR SMAL	L CALIBER

D. Acquisition Strategy

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.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	/				R-1 Pro PE 060 Ammur	ogram El 03639A / 1 nition	ement (N Tank and	umber/N Medium (ame) Caliber	Project EL8 / L/ FOR S/	(Numbe GHTWEI MALL CA	r/ Name) GHT CAR LIBER	TRIDGE	CASE
Product Developmen	it (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	0.251	0.230	Oct 2017	-		-		-		-	0.000	0.481	Continuing
Lightweight Case Phase 1 Development Contract	C/FFP	Orbital ATK : Missouri	0.636	-		-		-		-		-	0.000	0.636	Continuing
Lightweight Case Phase 2 Development Contract	C/CPFF	PCP Ammunition : Vero Beach, FL	-	0.685	Sep 2018	-		-		-		-	0.000	0.685	Continuing
Research	MIPR	United States Military Academy : New York	0.150	-		-		-		-		-	0.000	0.150	Continuing
Phase 2 Case Development	C/FP	Nammo Talley : Mesa, Arizona	0.783	-		-		-		-		-	0.000	0.783	Continuing
Modeling & Simulation	Option/ CPFF	Concurrent Technologies Corporation (CTC) : New Jersey	0.261	0.180	Apr 2018	-		-		-		-	0.000	0.441	Continuing
Lightweight Case Manufacturing Evaluation	SS/FP	Orbital ATK : Plymouth, Minnesota	0.316	-		-		-		-		-	0.000	0.316	Continuing
Lightweight case manufacturing evaluation	SS/FFP	Northrop Grumman Innovation Systems : Independence, MO	-	0.016	Feb 2018	-		-		-		-	0.000	0.016	Continuing
Lightweight ammuntion links development	Option/ CPFF	Northrop Grumman Innovation Systems : Independence, MO	-	0.309	Sep 2018	-		-		-		-	0.000	0.309	Continuing
		Subtotal	2.397	1.420		-		-		-		-	0.000	3.817	N/A
Support (\$ in Millions	5)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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	0.660	1.375	Oct 2017	-		-		-		-	0.000	2.035	Continuing

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 0603 Ammun	gram El 3639A / 7 iition	ement (N Fank and	umber/N Medium (ame) Caliber	Project EL8 / LI FOR SI	(Number GHTWEI MALL CAL	r/ Name) GHT CAR LIBER	TRIDGE	CASE
Support (\$ in Millions	5)		ſ	FY 2	018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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	0.660	1.375		-		-		-		-	0.000	2.035	N/A
Test and Evaluation (ſ	FY 2	018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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	-		-		-		-		-	0.000	0.039	Continuing
Temperature testing	MIPR	Armament Research Development and Engineering Center : New Jersey	0.010	-		-		-		-		-	0.000	0.010	Continuing
Army Joint Munitions Command Testing	MIPR	Army Joint Munitions Command : Illinois	-	0.075	Jun 2018	-		-		-		-	0.000	0.075	Continuing
		Subtotal	0.049	0.075		-		-		-		-	0.000	0.124	N/A
Prior Years					FY 2018		FY 2019		FY 2020 Base		2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	3.106	2.870		0.000		-		-		-	0.000	5.976	N/A		

Remarks

Appropriation/Budget Activity P: 4 Program Element (Number/Name) B: 4 Program Element (Number/Name) P: 2020 Project (Number/Name) Element Second Secon	Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army										Date	e: Ma	arch 20	19			
Event Name FY 2015 FY 2015 <th 2015<="" colspan="2" fy="" th=""><th>Appropriation/Budget Activity 2040 / 4</th><th></th><th colspan="9">R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i></th><th>er/Na EIGH ALIB</th><th>ame) IT CAR ER</th><th>TRIDO</th><th>GE C</th><th>ASE</th></th>	<th>Appropriation/Budget Activity 2040 / 4</th> <th></th> <th colspan="9">R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i></th> <th>er/Na EIGH ALIB</th> <th>ame) IT CAR ER</th> <th>TRIDO</th> <th>GE C</th> <th>ASE</th>		Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>									er/Na EIGH ALIB	ame) IT CAR ER	TRIDO	GE C	ASE
1 2 3 4 1 2 3	Event Name	FY 2018	FY 20	019	F	Y 2020		FY 2021		FY 202	22		FY 2	023		FY 20	024	
2 Adam Phase II 7 Adam Systems Requirement Review (SRR) 7 Adam Lightweight Ammo Transitions from BAO4 ELB to BAO 7 7 Adam Phase III 7 Adam Phase III 7 Adam Phase III 7 Adam Preliminary Design Review (PDR) 7 Adam Preliminary Validation Testing 7 Adam Ortical Design Review (CDR) 7 Adam Ortical Design Review (CDR) 7 Adam Ortical Design Review (CDR) 7 Adam Validation Testing 7 Adam Validation Testing 7 Adam Data III 7 Adam Data III 7 Adam Data III 7 Adam Ortical Design Review (CDR) 7 Adam Ortical Design Review (CDR) 7 Adam Validation Testing 7 Adam Data III 7 Adam Data IIII 7 Adam Data IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		1 2 3 4	1 2 3	3 4	1 2	3 4	1	2 3	4 1	2 3	4	1	2	3 4	1	2 :	3 4	
7.82mm Systems Requirement Review (SRR) 7.82mm Lightweight Ammo Transitions from BA04 ELB to BA07 ERB 7.82mm Childel Ammo Transitions from BA04 ELB to BA07 ERB 7.82mm Phase III 7.82mm Phase III 7.82mm Preliminary Design Review (PDR) 7.82mm Preliminary Validation Testing 7.82mm Preliminary Validation Testing 7.82mm Validation Testing 7.82mm Validation Testing 7.82mm Validation Testing 7.82mm Limited User Evaluation (LUE) 7.82mm Engineering Change Proposal 7.82mm Limited User Evaluation (LUE) 7.82mm Engineering Change Proposal 7.82mm Limited User Evaluation (LUE) 7.82mm Limited User Evaluation (LUE) 7.82mm Limited User Evaluation (LUE) 7.82mm Engineering Change Proposal	7.62mm Phase II	7.62mm Phase II																
7.62mm Lightweight Ammo Transitions from BAO4 ELB to BAO7 Down Select to 7.62mm Phase III 7.62mm Phase III 7.62mm Preliminary Design Review (PDR) 7.62mm Preliminary Validation Testing 7.62mm Validation Testing 7.62mm Validation Testing 7.62mm Validation Testing 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Proposal 7.62mm Limited User Proposal 7.62mm Limited User Proposal 7.62mm Limited User Proposal 7.62mm Limited User Evaluation (LUE)	7.62mm Systems Requirement Review (SRR) 7.62mm	Systems Requirement Rev	view (SRR)															
Down Select to 7.82mm Phase III 7.62mm Phase III 7.62mm Preliminary Design Review (PDR) 7.62mm Preliminary Validation Testing 7.62mm Critical Design Review (CDR) 7.62mm Validation Testing 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Low Rate Initial Production (LRIP) Award	7.62mm Lightweight Ammo Transitions from BA04 EL8 to BA07	7 ER6 7.62mm	2 LSCA BA04 to	BA07 Tran	sition													
7.62mm Phase III 7.62mm Phase III 7.62mm Preliminary Design Review (PDR) 7.62mm Preview (PDR) 7.62mm Preliminary Validation Testing 7.62mm Pre-Validation Testing 7.62mm Validation Testing 7.62mm Pre-Validation Testing 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Low Rate Initial Production (LRIP) Award Image: Comparison of the comp	Down Select to 7.62mm Phase III	Down	3 Select to 7.62mm	n Phase III														
7.62mm Preliminary Design Review (PDR) 7.62mm Preliminary Design Review (PDR) 7.62mm Pre-Validation Testing 7.62mm Critical Design Review (CDR) 7.62mm Pre-Validation Testing 7.62mm Critical Design Review (CDR) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited Iser Instance 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited Iser Instance 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited Iser Instance 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited Iser Instance 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited Iser Instance 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited Iser Instance 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.62mm Limited Iser Instance 7.6	7.62mm Phase III		7.62mm Ph	nase III														
7.62mm Preliminary Validation Testing 7.62mm Critical Design Review (CDR) 7.62mm Validation Testing 7.62mm Validation Testing 7.62mm Validation Testing 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LRIP) Award	7.62mm Preliminary Design Review (PDR)		7.62mm Prelimir	hary Design	1 Review (PDR)												
7.62mm Critical Design Review (CDR) 7.62mm Critical Design Review (CDR) 7.62mm Validation Testing 7.62mm Critical Design Review (CDR) 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Low Rate Initial Production (LRIP) Award 7.62mm Limited User Tevaluation (LRIP) Award	7.62mm Preliminary Validation Testing			7.62m	n Pre-Vali	dation Testing												
7.62mm Validation Testing 7.62mm Validation Testing 7.62mm Limited User Evaluation (LUE) 7.62mm Limited User Evaluation (LUE) 7.62mm Engineering Change Proposal 7.62mm Engineering Change Proposal 7.62mm Low Rate Initial Production (LRIP) Award 7.62mm Limited User Evaluation (LUE)	7.62mm Critical Design Review (CDR)				7.62r	5 nm Critical Des	sign Reviev	w (CDR)										
7.62mm Limited User Evaluation (LUE) 7.62mm Engineering Change Proposal 7.62mm Low Rate Initial Production (LRIP) Award	7.62mm Validation Testing						7.62	2mm Validati	on Testing									
7.62mm Engineering Change Proposal 6 7.62mm Low Rate Initial Production (LRIP) Award 7	7.62mm Limited User Evaluation (LUE)						7.62	2mm Limited	User Evalu	uation (LUE)								
7.62mm Low Rate Initial Production (LRIP) Award	7.62mm Engineering Change Proposal							6 7.62mm En	gineering	Change Prop	osal							
	7.62mm Low Rate Initial Production (LRIP) Award							7.6	2mm LRIP	Award								

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army	R-4A, RDT&E Schedule Details: PB 2020 Army Priation/Budget Activity R-1 Program Element (Number/Name)								
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Numb PE 0603639A / Tank and Med Ammunition	er/Name) um Caliber	Project (Number/Name) EL8 / LIGHTWEIGHT CARTRIDGE CAS FOR SMALL CALIBER						
	Schedule Details								
	E State Stat	itart	E	nd					
Events	Quarter	Year	Quarter	Year					
7.62mm Source Selection Evaluation	2	2017	4	2017					
7.62mm Phase II	4	2017	4	2018					
7.62mm Systems Requirement Review (SRR)	1	2018	1	2018					
7.62mm Lightweight Ammo Transitions from BA04 EL8 to BA	07 ER6 1	2019	1	2019					
Down Select to 7.62mm Phase III	1	2019	1	2019					
7.62mm Phase III	1	2019	2	2021					
7.62mm Preliminary Design Review (PDR)	2	2019	2	2019					
7.62mm Preliminary Validation Testing	4	2019	1	2020					
7.62mm Critical Design Review (CDR)	3	2020	3	2020					
7.62mm Validation Testing	1	2021	3	2021					
7.62mm Limited User Evaluation (LUE)	1	2021	2	2021					
7.62mm Engineering Change Proposal	3	2021	3	2021					
7.62mm Low Rate Initial Production (LRIP) Award	4	2021	4	2021					

Exhibit R-2A, RDT&E Project Ju	hibit R-2A, RDT&E Project Justification: PB 2020 Army											
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060363 Ammunitio	am Elemen 39A / Tank a n	t (Number/ nd Medium	Project (N EU3 <i>I .50 (</i> <i>Cartridge (</i>	Number/Name) Caliber All-Purpose Tactical (APTC)						
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	-	0.000	0.000	4.250	-	4.250	0.000	0.000	0.000	0.000	0.000	4.250
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber All-Purpose Tactical Cartridge (APTC) Project is a new start in FY 2020. In FY 2021, the project will transition to Budget Activity 05 (BA05) Program Element (PE) 0604802A, Project EU5, .50 Caliber All-Purpose Tactical Cartridge (APTC) to continue development work and support Engineering and Manufacturing Development (EMD).

A. Mission Description and Budget Item Justification

The All-Purpose Tactical Cartridge (APTC) project is a critical technology development in response to the .50 caliber Munitions Capabilities Development Documents (CDD). The overall objective of All-Purpose Tactical Cartridge is to deliver a single round that replaces and improves current legacy .50 caliber ammunition. The All-Purpose Tactical Cartridge will be compatible with all Army .50 caliber weapons but specifically optimized to work in the M2 Machine Guns. FY 2020 funding supports Technology Maturation and Risk Reduction (TMRR) in preparation for a Technology Readiness Level (TRL) 6, conducting a Materiel Development Decision (MDD), and conducting Design Verification Tests.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Technology Maturation and Risk Reduction (TMRR)	-	-	4.250
Description: Develop, demonstrate, and qualify new .50 Caliber ammunition to replace and/or improve current legacy .50 Caliber variants.			
FY 2020 Plans: Build, evaluate, and refine .50 Caliber APTC concepts/prototypes and perform Milestone B preparation activities. Evaluate M8 Armor Piercing Incendiary (API), M20 API Trace, M903 Saboted Light Armor Penetrator (SLAP), and M962 SLAP Trace ammunition for improvements that would satisfy the .50 APTC requirement.			
FY 2019 to FY 2020 Increase/Decrease Statement: Project is a new start beginning in FY 2020.			
Accomplishments/Planned Programs Subtotals	-	-	4.250

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army						Date: March 2019				
Appropriation/Budget Activity 2040 / 4	R-1 P I PE 06	r ogram Ele n 03639A / <i>Ta</i> l	nent (Numb nk and Medi	er/Name) um Caliber	Project (I EU3 / .50	Number/Na Caliber All-	me) Purpose Ta	ctical				
	Ammu	inition			Cartridge	(APTC)						
C. Other Program Funding Summa	ary (\$ in Milli	ons <u>)</u>										
			FY 2020	FY 2020	FY 2020					<u>Cost To</u>		
Line Item	<u>FY 2018</u>	FY 2019	Base	000	<u>Total</u>	<u>FY 2021</u>	FY 2022	FY 2023	FY 2024	Complete	Total Cost	
• EU5: .50 Caliber All-Purpose	-	-	0.000	-	0.000	8.500	9.400	-	-	0.000	17.900	
Tactical cartridge (APTC)												

Remarks

The effort under Budget Activity 04, Program Element (PE) 0603639A, Project EU3, .50 Caliber APTC, transitions in FY 2021 to Budget Activity 05, PE 0604802A, Project EU5. PE 0604802A, Project EU5 .50 Caliber APTC. Funding continues the development work and supports Engineering and Manufacturing Development (EMD) beginning in FY 2021.

D. Acquisition Strategy

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

E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	У								Date:	March 20)19	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammur	ogram El 03639A / T nition	ement (N Tank and	lumber/N Medium (ame) Caliber	Project EU3 / . Cartridg	t (Numbe 50 Caliber ge (APTC,	r/ Name) ^r All-Purpc)	ose Tactio	al
Product Developme	nt (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	FY 2020 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/CPFF	To be Determined : To be Determined	-	-		-		2.500	Jan 2020	-		2.500	Continuing	Continuing	Continuing
		Subtotal	-	-		-		2.500		-		2.500	Continuing	Continuing	N/A
Support (\$ in Millior	ıs)			FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	FY 2020 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	MIPR	Armament Research Development and Engineering Center (ARDEC) : New Jersey	-	-		-		1.000	Oct 2019	-		1.000	Continuing	Continuing	Continuing
		Subtotal	-	-		-		1.000		-		1.000	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	FY 2020 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
Verification Testing	MIPR	Army Research Lab (ARL) : Maryland	-	-		-		0.750	Jan 2020	-		0.750	Continuing	Continuing	Continuing
		Subtotal	-	-		-		0.750		-		0.750	Continuing	Continuing	N/A
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		4.250		-		4.250	Continuing	Continuing	N/A
<u>Remarks</u>						0.000		4.230				4.230	Continuing	Continuing	

Exhibit R-4, RDT&E Schedule Profile: PB 2020	Army								Da	te: N	larch 20)19		
Appropriation/Budget Activity 2040 / 4			R-1 Pro PE 060 Ammun	ogram 3639A hition	Elemer I Tank a	Project (EU3 / .50 <i>Cartridge</i>	ct (Number/Name) .50 Caliber All-Purpose Tactical dge (APTC)					al		
Event Name	FY 2018	FY 20)19	FY	2020	FY 2021	I	FY 2022		FY	2023		FY	2024
Event Name	1 2 3 4	1 2 3	3 4 1	1 2	3 4	1 2 3 4	1	2 3 4	1	2	3 4	1	2	3 4
APTC Materiel Development Decision (MDD)			APTO	MDD										
APTC Advanced Concept Development				APTC A	dvanced Cor	cept Development								
APTC Prototype Development & Evaluation				APTC P	rototype Dev	elopment & Evaluation								
APTC Design Verification Test (DVT) 1				APT	C DVT 1									
APTC Preliminary Design Review (PDR)					2 APT	C PDR								
APTC Milestone B						APTC MS B								
APTC Transitions from BA04 EU3 to BA05 EU5					A	PTC BA04 to BA05 Transi	ion							
APTC Engineering & Manufacturing Development (EMD)						APTC EMD								
APTC Pre-Production Qualification Testing (PPQT)						APTC	PPQT							
APTC Critical Design Review (CDR)							AF	5 PTC CDR						
APTC Design Verification Test (DVT) 2						APTC DVT 2								
APTC Production Qualification Testing (PQT)								APTC PQT						
APTC Milestone C (MS C)									6 APTC	мз с				

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Da	ate: March	า 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	e r/Name) ım Caliber	Project (Num EU3 / .50 Cal Cartridge (AP	t (Number/Name) 50 Caliber All-Purpose Tactica ge (APTC)		
	Schedule Details	S					
	[Si	tart		En	d	
Events		Quarter	Year	Qua	arter	Year	
APTC Materiel Development Decision (MDD)		1	2020		1	2020	
APTC Advanced Concept Development		1	2020		1	2021	
APTC Prototype Development & Evaluation		1	2020		1	2021	
APTC Design Verification Test (DVT) 1		2	2020	:	3	2020	
APTC Preliminary Design Review (PDR)		4	2020	4	4	2020	
APTC Milestone B		1	2021		1	2021	
APTC Transitions from BA04 EU3 to BA05 EU5		1	2021		1	2021	
APTC Engineering & Manufacturing Development (EMD)		2	2021	4	4	2022	
APTC Pre-Production Qualification Testing (PPQT)		4	2021	4	4	2021	
APTC Critical Design Review (CDR)		2	2022	2	2	2022	
APTC Design Verification Test (DVT) 2		2	2021	:	3	2021	
APTC Production Qualification Testing (PQT)	3	2022	4	4	2022		
APTC Milestone C (MS C)		1	2023		1	2023	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy					Date: Marc	h 2019			
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060363 Ammunitio	a m Element 9A / Tank a n	umber/Nan red Precisio	ber/Name) Precision Weapons and							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2023	FY 2024	Cost To Complete	Total Cost	
FA5: Assured Precision Weapons and Munitions	-	12.480	14.322	31.267	-	31.267	29.907	31.000	31.000	25.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-					

A. Mission Description and Budget Item Justification

The Assured Precision Weapons and Munitions (APWM) -FA5 Project is focused on advanced risk mitigation, technology integration, prototyping, and product support to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems within a complex system of systems environment. The Assured Precision Weapons and Munitions Project reinforces the National Defense Strategy's major lines of effort through technology development and prototyping that increase lethality and ensure future combat overmatch success of the Joint Force against peer/near-peer adversaries as well as improving program performance and affordability for multiple weapons and munitions Programs of Record (PoRs) via Joint Lethality Positioning, Navigation and Timing (PNT) and Army M-Code GPS coordinated efforts. The Assured Precision Weapons and Munitions Project directly supports Army Modernization Priorities in support of the National Defense Strategy. Funding will support engagement by Weapons and Munitions PNT experts in the development, evaluation, and technology delivery activities of the Air Force's M-Code GPS and Army's Assured PNT programs. Funding will also enable component and subsystem architecture input essential for precision weapons and munitions operating in a system of-systems environment, Army M-Code GPS technology integration and evaluation, and maturation of alternative positioning, navigation and timing related technologies to enable informed Assured PNT related program of record milestone and Army cross-functional modernization decisions.

Title: Assured Precision Weapons and Munitions Integrated Product Support - Joint Lethality PNT SME WIPT & Program	2.380	2.255	3.574
Management			
Description: Provide assured precision weapons and munitions technical subject matter expertise and support to the Joint oversight board for assured precision weapons and munitions. Provide overall APWM Project Program Management support.			
<i>FY 2019 Plans:</i> The subject matter experts will continue coordinating with and supporting the development and technology delivery activities of the Air Force?s Military GPS User Equipment (MGUE) Program and the Army?s Assured Positioning, Navigation and Timing (A-PNT) program including participation in design reviews, evaluation and formal feedback on technology and systems requirements and 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 (PGMs). Specific support focus includes requirements for Military GPS User Equipment (MGUE) Increment 2 (aka Next Generation) and alternative Positioning, Navigation and Timing (PNT) technology maturity.			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019						
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Proje FA5 / <i>Munit</i>	j ect (Number/Name) I Assured Precision Weapons and hitions			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020	
The subject matter experts will continue coordinating with and supporting the d Air Force?s Military GPS User Equipment (MGUE) program and the Army?s As program including participation in design reviews, evaluation and formal feedba performance, component and subsystem architecture input essential for preciss of-systems environment, and configuration management of the evolving Joint C Document for Precision Guided Munitions (PGMs). Specific support focus inclu (MGUE) Increment 2 and alternative Positioning, Navigation and Timing (PNT)	evelopment and technology delivery activities ssured Positioning, Navigation and Timing (PN ack on technology and systems requirements a ion weapons and munitions operating in a sys Common GPS Specification and Interface Con ides requirements for Military GPS User Equip technology maturity.	of the IT) and cem- trol ment				
FY 2019 to FY 2020 Increase/Decrease Statement: Increase is due to scope of work and ramp up of Military GPS User Equipment (MGUE) Increment 2 and alternative PNT related equities affecting the lethality community. Additional subject matter support (SME) support is required to initialize the framework and requirements for development of these Assured Positioning, Navigation and Timing (A-PNT) technologies to be demonstrated within Lethality Programs of Record (PoRs). Additional program management support required to manage increased project scope and funding starting in FY 2020.						
Title: Assured PNT related Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD)		0.500	-	-		
Description: Mature and test Zero-Age-of-Data (ZAOD) for improved measurement accuracy of Network Assisted GPS data provided to Users.						
Title: Assured PNT related Integration Risk Mitigation - A-PNT for Family of Sc	atterable Mines (FASCAM) Replacement		-	0.767	2.081	
Description: Evaluate, mature and test Assured-Position, Navigation, and Tim terrain shaping enabling technologies.	ing (A-PNT) system/subsystem components f	or				
<i>FY 2019 Plans:</i> Initiate analysis and evaluation of various assured precision prototype technoloc technologies to support the program of record in their Analysis of Alternatives (<i>FY 2020 Plans:</i> Down-select assured precision technologies including alternative Positioning, N terrain shaping Program of Record (PoR) communication capabilities through r corresponding technology demonstrations.	ogies for future terrain shaping enabling AoA). Navigation and Timing (PNT) technologies for t nodeling and simulation based verification to in	uture nitiate				
FY 2019 to FY 2020 Increase/Decrease Statement:						
		·	·	·		

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	Date: March 2019			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (Number/Name) FA5 I Assured Precision Weapons and Munitions				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020		
Additional funding is required to support increasing level of work involved in evaluation and Timing (A-PNT) technologies for down selection.	aluating and maturing Assured Positioning,					
Title: Assured PNT related Integration Risk Mitigation - Network Assisted A-PN	IT (NA2) for Weapons & Munitions Phase 1	4.200	6.300	-		
Description: Evaluate, mature and demonstrate technologies for modifying Net data exchange that support Alternative Positioning, Navigation and Timing (PN	etwork Assisted GPS (NA GPS) and associate NT) and M-Code for Weapons and Munitions.	3				
FY 2019 Plans: Software development and test for an initial updated Network Assisted GPS pr Navigation and Timing (PNT) and M-Code in Phase 1.	rototype that incorporates Alternative Positioni	ng,				
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to Phase 1 of Network Assisted Assured-PNT (NA2) for Weapor technologies down selected for future implementation in Phase 2 upgrades.	ns and Munitions will be completed and					
Title: Assured PNT related Integration Risk Mitigation - NA2 for Weapons and	Munitions Phase 2	-	-	5.672		
Description: Perform Network Assisted Assured-PNT (NA2) systems of system qualification integration risk reduction activities. Improve initial prototype NA2 c subsequent transition to corresponding program of records. Inform future Navi Positioning, Navigation and Timing (PNT) related weapons and munitions platfer	ms capability integration and pre-system apability and initiate improved prototype for gational Warfare (NAVWAR) and alternative orm dependencies.					
<i>FY 2020 Plans:</i> Include down-selected alternative Positioning, Navigation and Timing (PNT) tee PNT phase 1 prototype into improved phase 2 Network Assisted Assured-PNT Network Assisted Assured-PNT systems of systems capability integration and activities and finalize prototype software solutions.	chnologies from initial Network Assisted Assur system of system prototype solution. Perform pre-system qualification integration risk reduct	ed- on				
FY 2019 to FY 2020 Increase/Decrease Statement: Phase 2 of Network Assisted Assured-PNT for Weapons and Munitions begins builds upon the results and technology down-selects of Network Assisted Assu	in FY 2020 and will take two years. This effor ired-PNT Phase 1.	t				
Title: Assured PNT related Integration Risk Mitigation - NA2 for Guided Rocket	t/Missile Launcher Systems	-	-	3.000		
Description: Perform software development and prototyping activities to demo for Rocket/Missile artillery launcher systems. Integrate and demonstrate upgrad Assisted Assured-PNT systems of systems networked capability to reduce sub	onstrate Network Assisted Assured-PNT capat ded artillery launcher system into the Network sequent program of record fielding risks.	ility				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N FA5 / Ass Munitions	ct (Number/Name) Assured Precision Weapons and ions		
B. Accomplishments/Planned Programs (\$ in Millions)		F	í 2018	FY 2019	FY 2020
FY 2020 Plans: Conduct requirements refinement activities and initiate software development and prototyping activities to provide initial Network Assisted Assured-PNT (NA2) capability for Rocket/Missile artillery launcher systems. Initiate prototyping risk mitigation activities for Rocket/Missile artillery launcher systems.		vork ies			
FY 2019 to FY 2020 Increase/Decrease Statement: Effort starts in FY 2020 and will take two years. Effort leverages results of Network	work Assisted Assured-PNT (NA2) Phase 1.				
Title: Assured PNT related Weapons & Munitions Prototyping - A-PNT upgrade	es for PGM Fuze Setter		3.500	2.137	-
Description: Develop, prototype, and evaluate required emerging Assured-PNT technology enhancements to the Precision Guided Munition (PGM) Fuze Setter needed to enable continued performance Precision Guided Munitions in a realistic operational threat environment.					
FY 2019 Plans: Software development, integration and test for an upgraded Precision Guided Munition (PGM) Fuze Setter incorporates M-Code to enable continued performance of Precision Guided Munitions in a threat environment. Program transitions to program of record in FY 2020.		ode ecord			
FY 2019 to FY 2020 Increase/Decrease Statement: Prototyping effort will be completed. Program transitions to program of record in FY 2020.					
Title: Assured PNT related Weapons & Munitions Prototyping - A-PNT upgrade	e: Assured PNT related Weapons & Munitions Prototyping - A-PNT upgrades for Towed Howitzer Platforms		1.100	0.472	-
Description: Prototype and evaluate Military GPS User Equipment (MGUE) In M777A2 and M119A3 Towed Howitzer Platforms and evaluate technologies for Munitions.	crement 1 (M-Code) GPS receiver cards in the r providing Assured-PNT to Precision Guided	9			
FY 2019 Plans: Update GPS receiver interfaces on fire platforms, integrate and test prototype I interoperability, and assess corresponding performance impacts.	Military GPS User Equipment (MGUE) Inc 1 ca	ards			
FY 2019 to FY 2020 Increase/Decrease Statement: Demonstration of prototype Military GPS User Equipment (MGUE) Inc 1 cards	in Towed Howitzer Platforms will be complete	d.			
Title: Assured PNT related Weapons & Munitions Prototyping - Alternative Nav	rigation Technologies (AltNav) Phase 1		0.800	1.866	-
Description: Develop, prototype, and evaluate non-Global Positioning System prototype systems for indirect fires, including Long Range Precision Fires.	Radio Frequency (Non-GPS RF) Navigation				
Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Proje FA5 / <i>Muniti</i>	ct (Number/I Assured Prec ons	Name) cision Weapo	ons and
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2018	FY 2019	FY 2020
FY 2019 Plans: Prototyping and evaluation of non-Global Positioning System Radio Frequence a modeling and simulation environment that can meet current navigation and GPS degraded environment.	cy (Non-GPS RF) Navigation prototype systems timing requirements without access to GPS or	s in in a			
FY 2019 to FY 2020 Increase/Decrease Statement: Initial Phase 1 demonstrations of non-Global Positioning System Radio Frequenvironment will be completed.	uency (Non-GPS RF) in modeling and simulatio	n			
Title: Assured PNT related Weapons & Munitions Prototyping - AltNav Techn	ologies (AltNav) Phase 2		-	-	5.140
Description: Design and develop a prototype Alternative Navigation (AltNav) guided munition applications. Demonstrate and conduct performance assess support Artillery integration efforts as well as inform future Space-based PNT	hardware and software capability for precision ments of potential hardware and software solut related alternatives for the Land Combat doma	ons to in.			
FY 2020 Plans: Design and develop an Alternative Navigation (AltNav) capable hardware and (PGM) applications to demonstrate and quantify AltNav performance. Perform prototype to conduct a ride-along performance evaluation of AltNav in a PGM	d software prototype for Precision Guided Munit n integration efforts with the hardware and softw l environment.	ion vare			
FY 2019 to FY 2020 Increase/Decrease Statement: AltNav Phase 2 begins in FY20 will take two years. This prototyping effort bu AltNav Phase 1.	ilds upon the modeling and simulation results c	f			
Title: Assured PNT related Weapons & Munitions Prototyping - Location Azin	nuth Determinations System (LADS)		-	-	1.400
Description: Development and integration of prototype LADS to demonstrate M777A2 and M119A3 Howitzer Platforms.	e an assured weapon survey capability within th	e			
FY 2020 Plans:					
Development and integration of prototype LADS into the M777A2 and M119A	3 Howitzer Platforms.				
FY 2019 to FY 2020 Increase/Decrease Statement: This effort begins in FY20.					
Title: Army M-Code Technology Integration and Evaluation			-	-	9.200
Description: Provide technical assessment, coordination, and engineering su integration, and evaluation of Air Force?s Military GPS User Equipment (MGU	upport related to the development, prototyping, JE) technology deliverables across all Army				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition	Proje FA5 / <i>Muniti</i>	ject (Number/Name) 5 I Assured Precision Weapons and nitions				
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2018	FY 2019	FY 2020		
Weapons and Munitions, including participation in design reviews, testing, eval component-level, card-level, sub-system-level, and systems-level requirements inform M-Code GPS related Army cross-functional modernization decisions for threat system-of-systems environment as well as identifying complementary PN sufficient to enable Combat Overmatch.	uation, and formal feedback on technology, and performance. Reduce risk, support, and weapons and munitions operating in a peer/n NT solutions when M-Code GPS is not solely	ear					
FY 2020 Plans: Establish an Army M-Code GPS Weapons and Munitions Integrated Product To and representation of requirement and performance based needs for Army We s Military GPS User Equipment (MGUE) technology investments, including low Land Combat applications. Establish a centralized Army evaluation and experi of M-Code GPS focused weapon and munition platform capabilities operating in environment.	eam (IPT). Initiate the definition, documentati apons and Munitions to influence the Air Forc power and high performance cross-functional mentation mechanism to assess the effective n a peer/near PNT threat system-of-systems	on, e? ness					
FY 2019 to FY 2020 Increase/Decrease Statement: This effort begins in FY20.							
Title: MGUE Inc 2 with PGK AJ			-	-	1.200		
Description: Influence next generation Military GPS User Equipment (MGUE) needs and requirements are met with the Air Force's next generation MGUE. In Precision Guidance Kit - Anti Jam (PGK-AJ) to verify and validate needs and references and references.	development to ensure precision guided mun ntegrate and test next generation MGUE into t equirements are met by next generation MGU	tion he Ξ.					
<i>FY 2020 Plans:</i> Finalize next generation Precision Guided Munition (PGM) Military GPS User E document for use by the MGUE program. Attend technical interchange meeting to meet Precision Guided Munitions needs and requirements for next generation activities of MGUE vendor designs.	equipment (MGUE) technical requirements gs with MGUE vendors to influence MGUE de on performance. Perform risk reduction analys	signs s and					
FY 2019 to FY 2020 Increase/Decrease Statement: This effort is a new start in FY 2020. FY 2020 is the fiscal year in which the Mili start significant design work to meet the requirements of the MGUE Precision C document.	tary GPS User Equipment (MGUE) developer Guided Munitions (PGM) technical requiremen	s will ts					
Title: FY 2019 SBIR/STTR Transfer			-	0.525	-		
Description: FY 2019 SBIR/STTR Transfer							

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	larch 2019		
Appropriation/Budget Activity 2040 / 4	Proje FA5 / <i>Muniti</i>	ect (Number/Name) I Assured Precision Weapons and hitions				
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2018	FY 2019	FY 2020	
<i>FY 2019 Plans:</i> FY 2019 SBIR/STTR Transfer						
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR Transfer						
	Accomplishments/Planned Programs Sub	totals	12.480	14.322	31.267	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A						

Remarks

D. Acquisition Strategy

Acquisition Strategy: The Assured Precision Weapons and Munitions Project will utilize a combination of the Defense Ordinance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) contract mechanism and In-House government development and engineering capabilities to obtain prototypes and demonstrate/evaluate the maturity and integration risk of the M-Code GPS on Precision Munitions and Weapons as well as other alternative PNT related capabilities.

E. Performance Metrics

N/A

Appropriation/Budget Ac											_				
204074	ctivity	,				R-1 Pro PE 060 Ammur	ogram Ele 3639A / Ta hition	ement (N ank and l	umber/Na Medium C	a me) aliber	Project FA5 / A Munition	(Number ssured Pr ns	r/ Name) recision W	/eapons a	and
Product Development (\$	\$ in Mi	llions)	ſ	FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total			
Col Me Cost Category Item &	ontract lethod & 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 M Reduction	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	7.785	-		-		-		-		-	0.000	7.785	-
Assured PNT related Weapons Integration Risk M Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	-	3.265	Dec 2017	3.585	Dec 2018	4.453	Dec 2019	-		4.453	Continuing	Continuing	Continuing
Assured PNT related Weapons Integration M Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD, Various : Various	-	2.000	Dec 2017	2.000	Dec 2018	1.400	Dec 2019	-		1.400	Continuing	Continuing	Continuing
Assured PNT related Munitions Integration Risk M Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	-	2.500	Dec 2017	2.500	Dec 2018	4.700	Dec 2019	-		4.700	Continuing	Continuing	Continuing
Assured PNT related Munitions Integration M Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	-	2.000	Dec 2017	2.000	Dec 2018	4.740	Dec 2019	-		4.740	Continuing	Continuing	Continuing
Army M-Code Technology Integration and Evaluation	MIPR	Various : Various	-	-		-		6.650	Dec 2019	-		6.650	Continuing	Continuing	Continuing
		Subtotal	7.785	9.765		10.085		21.943		-		21.943	Continuing	Continuing	N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20)19	
Appropriation/Budge 2040 / 4	¥ Activity	1				R-1 Pro PE 060 Ammur	ogram Ele 3639A / Ta hition	ment (N ank and i	umber/Na Medium C	a me) Caliber	Project FA5 / A Munitio	: (Numbe i ssured Pr ns	r/ Name) recision N	/eapons a	and
Support (\$ in Million	s)			FY :	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 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	Joint Program Executive Office Armaments and Ammunition (JPEO A&A) : Picatinny Arsenal, NJ	0.508	0.505	Dec 2017	1.180	Dec 2018	1.269	Dec 2019	-		1.269	Continuing	Continuing	Continuing
Assured Precision Weapons and Munitions IPT Support	MIPR	Various : Various	1.106	1.755	Dec 2017	1.075	Dec 2018	2.305	Dec 2019	-		2.305	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	0.380	0.455	Dec 2017	0.657	Dec 2018	1.200	Dec 2019	-		1.200	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Communication Electronics Research,Development and Engineering Center (CERDEC) : Aberdeen Proving Ground, MD	.t	-		0.800	Dec 2018	0.800	Dec 2019	-		0.800	Continuing	Continuing	Continuing
Army M-Code Technology Integration and Evaluation Support	MIPR	Various : Various	-	-		_		2.550	Dec 2019	-		2.550	Continuing	Continuing	Continuing
MGUE Inc 2 for PGK AJ Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		1.200	Dec 2019	-		1.200	Continuing	Continuing	Continuing
FY 2019 SBIR/STTR Transfer	Various	Various : Various	-	-		0.525		_		-		-	Continuing	Continuing	Continuing
		Subtotal	1.994	2.715		4.237		9.324		-		9.324	Continuing	Continuing	N/A

PE 0603639A: *Tank and Medium Caliber Ammunition* Army

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Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	020 Arm	y								Date:	March 20)19	
Appropriation/Budge 2040 / 4		R-1 Pro PE 060 Ammun	ogram El 3639A / T hition	ement (N Tank and	lumber/N Medium (ame) Caliber	Project FA5 / A Munition	(Number ssured Pr ns	r/ Name) recision W	/eapons a	nd				
Support (\$ in Millions	upport (\$ in Millions)				FY 2018			FY 2 Ba	2020 ase	FY 2020 OCO		FY 2020 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 Precision Weapon	s and Munit	ions IPT support increas	ses by \$0.7	05 million d	lue to increa	sed project	scope in F	Y 2020.				-			
			Prior Years	FY	2018	FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals 9.779 12.480						14.322 31.267 -					31.267	Continuing	Continuing	N/A	

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy						Date: March 20	19
Appropriation/Budget Activity 2040 / 4		 	R-1 Pr PE 06 A <i>mmu</i>	r ogram Elemen 03639A / Tank a Inition	Number/Name) sured Precision Weapons and			
Event Name	FY 2018	FY 201	9	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
	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
Integrated Product Support - Joint Lethality PNT SME WIPT & Pr								
Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD								
Integration Risk Mitigation - Family of Scatterable Mines (FASCA	M) Replacement							
Integration Risk Mitigation - NA2 for Weapons & Munitions Phas								
Integration Risk Mitigation - NA2 for Weapons & Munitions Phase	e 2							
Integration Risk Mitigation - NA2 for Rocket/Missile Launcher								
Integration Risk Mitigation - Fire System-of-Systems APNT relate	d C2 & AS							
Integration Risk Mitigation - Next Generation PNT Technologies	Phase 1							
Weapons & Munitions Prototyping - APNT upgrades for PGM Fu								
Weapons & Munitions Prototyping - APNT upgrades for Towed H								
Weapons & Munitions Prototyping - Alternative Navigation Tech								
Weapons & Munitions Prototyping - Alternative Navigation Tech	nologies Phase 2							
Weapons & Munitions Prototyping - Location Azimuth Determina	itions System (LADS)							
1					I			1]

Exhibit R-4, RDT&E Schedule Profile: PB 2020 /									Date: March 2019									
Appropriation/Budget Activity 2040 / 4	Appropriation/Budget Activity 040 / 4							R-1 Program Element (Number/Name)ProjectPE 0603639A / Tank and Medium CaliberFA5 / AsAmmunitionMunition								(Number/Name) sured Precision Weapons and s		
Event Neme	FY	2019			FY 2	2020		FY 2021		FY 2022	FY 2023	FY 2024						
Event Name	1	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		
Weapons & Munitions Prototyping - Next Generation PNT Tech	nolo	gies P	hase 1															
Army M-Code Technology Integration and Evaluation																		
MGUE INC 2 for PGK AJ																		

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N FA5 / Assu Munitions	umber/Name) Ired Precision Weapons and

Schedule Details

	S	tart	Er	ld
Events	Quarter	Year	Quarter	Year
Integrated Product Support - Joint Lethality PNT SME WIPT & Program Management	1	2017	4	2028
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 - NA2 for Weapons & Munitions Phase 1	1	2018	4	2019
Integration Risk Mitigation - NA2 for Weapons & Munitions Phase 2	1	2020	4	2021
Integration Risk Mitigation - NA2 for Rocket/Missile Launcher	1	2020	4	2021
Integration Risk Mitigation - Fire System-of-Systems APNT related C2 & AS	1	2021	4	2022
Integration Risk Mitigation - Next Generation PNT Technologies Phase 1	1	2023	4	2024
Weapons & Munitions Prototyping - APNT upgrades for PGM Fuze Setter	1	2018	4	2019
Weapons & Munitions Prototyping - APNT upgrades for Towed Howitzer Platforms	1	2018	4	2019
Weapons & Munitions Prototyping - Alternative Navigation Technologies Phase 1	1	2018	4	2019
Weapons & Munitions Prototyping - Alternative Navigation Technologies Phase 2	1	2020	4	2021
Weapons & Munitions Prototyping - Location Azimuth Determinations System (LADS)	1	2020	4	2020
Weapons & Munitions Prototyping - Next Generation PNT Technologies Phase 1	1	2022	4	2023
Army M-Code Technology Integration and Evaluation	1	2020	4	2028
MGUE INC 2 for PGK AJ	1	2020	4	2027

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy						Date: March 2019			
Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 4 PE 0603639A / Tank and Medium Caliber FG1 / Cannon-Delivered Area Ammunition Munitions (C-DAEM)							1e) ed Area Effe	ects				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.960	4.941	25.897	-	25.897	14.826	19.765	22.724	24.500	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY 2020 funding increase supports the Army's modernization priorities and development efforts to replace the current 155mm Dual Purpose Improved Conventional Munitions (DPICM) stockpile with DoD policy compliant munitions in support of the National Defense Strategy.

A. Mission Description and Budget Item Justification

The Cannon-Delivered Area Effects Munitions (C-DAEM) Project is a two increment approach to provide U.S. ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018. The purpose of the C-DAEM AoA was to inform acquisition and investment decisions by the Army regarding replacement of the current stockpile of 155mm Dual Purpose Improved Conventional Munitions (DPICM) with DoD policy compliant munitions and address anti-armor and extended range capability requirements identified in the C-DAEM Initial Capabilities Document (ICD). The Army validated a two increment solution for C-DAEM. Increment I will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. Increment II will destroy personnel, materiel, air defense artillery and rocket launchers. Increment I and II will be developed simultaneously. FY 2020 resources will fund the competitive demonstrations for Increment I, as well as early detailed design testing supporting the qualification of Increment II to support the Army's modernization priorities in support of the National Defense Strategy.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: C-DAEM Analysis of Alternatives (AoA), Capability Development Document (CDD), & Milestone A Support	0.960	1.960	-
Description: The purpose of the C-DAEM Alternatives of Analysis (AoA) was to inform acquisition and investment decisions by Army leadership to replace the current stockpile of 155mm Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense policy compliant munitions and address anti-armor and extended range capability requirements identified in the C-DAEM Initial Capabilities Document (ICD).			
FY 2019 Plans: FY 2019 supports the preparation and release of a Request for Proposals (RFP) for technologies and capabilities identified through the Analysis of Alternatives (AoA), as well as the development of the Capabilities Development Document (CDD) for each technology.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date:	March 2019		
Appropriation/Budget Activity 2040 / 4	Project (Number FG1 / Cannon-De Munitions (C-DAE	/Name) livered Area E EM)	ffects	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Decrease in funding due to achieved knowledge points of research a and II.	and development efforts in support of C-DAEM Increment	sl		
Title: C-DAEM Increment I		-	-	17.000
Description: C-DAEM Increment I will destroy infantry fighting vehic	les, self-propelled howitzers, and tanks.			
FY 2020 Plans: FY 2020 will support a competitive demonstration phase to identify the armored targets.	ne most promising candidate(s) that address medium to h	ieavy		
FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funding in FY 2020 is based on the AoA and C-DAEM stasolution.	rategy per the April 2018 AROC decision for a two incren	ient		
Title: C-DAEM Increment II		-	2.800	8.897
Description: C-DAEM Increment II will destroy personnel, materiel,	air defense artillery and rocket launchers.			
FY 2019 Plans: FY2019 funds will be used to purchase prototypes to support Increm	ent II TMRR phase testing.			
FY 2020 Plans: FY 2020 funds will support the early design testing of candidates the the personnel to medium armored target set.	Alternative of Analysis (AoA) had recommended addres	sing		
FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funding to cover Increment II prototype hardware and dea	sign testing.			
Title: FY 2019 SBIR / STTR Transfer		-	0.181	-
FY 2019 Plans: FY 2019 SBIR / STTR Transfer				
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer				
	Accomplishments/Planned Programs Sub	otals 0.960	4.941	25.897
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N FG1 / Canr Munitions (u mber/Name) non-Delivered Area Effects ′C-DAEM)

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

<u>Remarks</u>

In FY 2021, this Project will transition to Budget Activity 05, PE 0604802A Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM). A Procurement Ammunition, Army C-DAEM funding line will be established in FY 2023.

D. Acquisition Strategy

C-DAEM will employ an evolutionary acquisition approach to efficiently transition the unique ammunition products as they become available. The Analysis of Alternatives (AoA) completed on 31 January 2018 qualified a dramatic enhancement of operational Fires effectiveness, efficiency, and maneuver support when cannon artillery was equipped with a dedicated extended range, anti-armor projectile. In FY 2019, C-DAEM is reducing risk by beginning prototype testing and evaluation in parallel to decomposing the AoA results into selection criteria. C-DAEM will use the selection criteria to sponsor a competitive demonstration for this first increment (medium to heavy armor) to streamline the acquisition process by leveraging Section 815 of the National Defense Authorization Act (NDAA) for FY 2016. C-DAEM will use the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) to commission the demonstration phase in FY 2020. For following increments to address personnel to medium armored targets, C-DAEM will use DOTC OTA to execute risk reduction testing in FY 2020 in parallel to the Increment I demonstrations. C-DAEM will then be in position to proceed to qualification testing of the next promising candidates to update plans for the next capability.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	019	
Appropriation/Budge 2040 / 4	et Activity	/		R-1 Pro PE 060 <i>Ammur</i>	ogram Ele 3639A / 7 hition	ement (N Tank and	l umber/N a Medium C	ame) Caliber	Project FG1 / C Munition	(Number/Name) Cannon-Delivered Area Effects ns (C-DAEM)					
Management Service	es (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.410	May 2018	0.935	Nov 2018	0.935	Nov 2019	-		0.935	Continuing	Continuing	Continuing
		Subtotal	-	0.410		0.935		0.935		-		0.935	Continuing	Continuing	N/A
Remarks Program Management incl Product Development	udes C-DAE	M travel and milestone	documenta	tion suppor	t			FY	2020	FY	2020	FY 2020]		
· · · · · · · · · · · · · · · · · · ·	Contract			FY 2	2018	FY 2019		Base		UCO		Total			Target
Cost Category Item	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	Value of Contract
Increment I TMRR Phase	MIPR	DoD Ordnance Technology Consorium (DOTC) : TBD	-	-		-		17.000	Dec 2019	-		17.000	Continuing	Continuing	Continuing
Increment II Prototype Hardware	MIPR	DoD Ordnance Technology Consorium (DOTC) : TBD	-	-		2.400	Feb 2019	4.164	Dec 2019	-		4.164	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.181		-		-		-	0.000	0.181	-
		Subtotal	-	-		2.581		21.164		-		21.164	Continuing	Continuing	, N/A
Support (\$ in Million	s)		FY 2018 FY 2019 FY 2020 FY 2020 FY 2018 FY 2019 Base OCO		2020 CO	FY 2020 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	Armamemt Resarch Development Engineering Center	-	0.550	May 2018	1.025	Nov 2018	1.798	Oct 2019	-		1.798	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20)19	
Appropriation/Budg 2040 / 4	et Activity	1				R-1 Pro PE 060 Ammur	ogram Ele 3639A / T hition	ement (N ank and	umber/N Medium (ame) Caliber	Project FG1 / C Munition	(Number Cannon-De ns (C-DAL	r/ Name) elivered A EM)	rea Effec	ts
Support (\$ in Millior	ıs)			FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Award Cost Date Cost		Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
		(ARDEC) : Picatinny Arsenal, NJ													
		Subtotal	-	0.550		1.025		1.798		-		1.798	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY	2020 CO	FY 2020 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
Increment II Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		0.400	Feb 2019	2.000	Mar 2020	-		2.000	Continuing	Continuing	Continuing
		Subtotal	-	-		0.400		2.000		-		2.000	Continuing	Continuing	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	0.960		4.941		25.897		-		25.897	Continuing	Continuing	N/A
								-							

Remarks

Increment I will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. Increment II will destroy personnel, materiel, air defense artillery and rocket launchers.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army							Date: March 20	19
Appropriation/Budget Activity 2040 / 4			R-1 Pr PE 060 <i>Ammu</i>	ogram Ele 03639A / 7 nition	emen Fank a	t (Number/Name and Medium Calil	e) Project (ber FG1 / Ca Munitions	Number/Name) nnon-Delivered Al s (C-DAEM)	rea Effects
Event Name	FY 2018	FY 20	19	FY 20	20	FY 2021	FY 2022	FY 2023	FY 2024
Increment I Milestone A	1 2 3 4	1 2 3 1	4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Increment I TMRR Competitive Demonstration / EMD	,	IS-A							
Increment I Preliminary Design Review (PDR)					2				
Increment I Milestone B					T DIX	5			
Increment I Critical Design Review (CDR)						-6W			
Increment I Milestone C							CDIX		9 M5-0
Increment II Prototyping		Prototyc	ping						
Increment II Early Design Testing and Live Fire Demonstration			Early De	sian Testina an	d Live F	re Demonstration			
Increment II Preliminary Design Review (PDR)					3 PDR				
Increment II Milestone B						4 MS-B			
Increment II Production Qualification Testing (PQT)						PQT			
Increment II Critical Design Review (CDR)									
Increment II Milestone C									A MS-C

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xhibit R-4A, RDT&E Schedule Details: PB 2020 Army	Date: March 2019							
ppropriation/Budget Activity 040 / 4	R-1 Program PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	r/Name) m Caliber	Project (Number/Name) FG1 / Cannon-Delivered Area Effect Munitions (C-DAEM)				
	Schedule Details	S						
		St	art	Er	ıd			
Events		Quarter	Year	Quarter	Year			
Increment I Milestone A		1	2019	1	2019			
Increment I TMRR Competitive Demonstration / EMD		1	2019	3	2024			
Increment I Preliminary Design Review (PDR)		4	2020	4	2020			
Increment I Milestone B		4	2021	4	2021			
Increment I Critical Design Review (CDR)		2	2022	2	2022			
Increment I Milestone C		4	2024	4	2024			
Increment II Prototyping		2	2019	4	2019			
Increment II Early Design Testing and Live Fire Demonstration		4	2019	4	2020			
Increment II Preliminary Design Review (PDR)		4	2020	4	2020			
Increment II Milestone B		1	2021	1	2021			
Increment II Production Qualification Testing (PQT)		1	2021	1	2024			
Increment II Critical Design Review (CDR)		2	2022	2	2022			
Increment II Milestone C	2	2024	2	2024				
			L					

<u>Note</u>

C-DAEM Increments I and II will be pursued simultaneously. Increment I will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. Increment II will destroy personnel, materiel, air defense artillery and rocket launchers.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	Army							Date: Mai	rch 2019			
Appropriation/Budget Activity 2040 / 4	propriation/Budget Activity 40 / 4						R-1 Program Element (Number/Name)Project (NumPE 0603639A / Tank and Medium CaliberXT5 / 30mm AAmmunitionUAS							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost		
XT5: 30mm Anti-Personnel and Counter UAS	-	2.475	3.854	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.329		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
Airburst capability provides the us dual purpose warhead, allowing it and soft-skin vehicular targets inc reach the desired lethal effects.	ser with a n t to continu creasing Sc There is no	nuch higher e to defeat l oldier Surviv funding rec	probability probability light armore ability on th juested in F	of achieving of achieving d threats th e ground du Y 2020.	a first burs rough poin uring troops	t detonation in contact e	iy engage a st enemy pe . The cartric engagemen	rsonnel targ Ige provide ts and decr	gets in the o s increased eases the re	pen. The L lethal effect equired nut	W30 will ref w30 will ref ts against p mber of rour	ain its personnel nds to		
B. Accomplishments/Planned P	rograms (\$ in Million	<u>s)</u>						FY	2018	FY 2019	FY 2020		
Title: Lechnology Maturation and	Risk Redu	ction (IMRI	≺)							2.475	3.730	-		
Description: Demonstrating Tech	nology Re	adiness Lev	el 6 and ac	hieving pre	-Milestone	(MS) B appr	roval.							
FY 2019 Plans: FY 2019 activities include continu 6 demonstration of the ability to se weapon system. Vendors will cont integration into the M789 round. T with the demonstration of a proxin	ing activitie elect airbur tinue to dev The main ef nity airburs	es to reduce st or point d velop the cri ffort in FY 20 t round firec	risk and ma letonating (l itical techno 019 will focu I from a gro	ature techno PD) functior logies to be us on ammu und mounte	ology with a nality when e designed unition and ed weapon.	a goal of a T fired from a and tested a system integ	echnology I M230 grou at the sub-sy gration whic	Readiness nd mounteo ystem level h will culmi	Level d for nate					
FY 2019 to FY 2020 Increase/De Decrease in funding due to compl	ecrease State	atement: chnology M	aturation ar	nd Risk Red	luction proje	ect in FY 20	19.							
Title: FY 2019 SBIR / STTR Trans	sfer									-	0.124	-		
FY 2019 Plans: FY 2019 SBIR / STTR Transfer														
FY 2019 to FY 2020 Increase/De FY 2019 SBIR / STTR Transfer	ecrease Sta	atement:												
					Accomplia	shments/Pl	anned Prog	grams Sub	totals	2.475	3.854	-		

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N XT5 / 30m UAS	umber/Name) m Anti-Personnel and Counter
C. Other Program Funding Summary (\$ in Millions) N/A			
Remarks			

D. Acquisition Strategy

The development of the Lightweight 30mm (LW30, 30mmx113mm) Airburst cartridge during the Technology Maturation and Risk Reduction (TMRR) phase will occur via an Other Transaction Authority (OTA) award and a Technology Readiness Level (TRL) 6. The TMRR effort will consist of critical technology prototyping, testing, and demonstrating in the relevant environment.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19					
Appropriation/Budg 2040 / 4	et Activity	1				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Tank and	lumber/N Medium (ame) Caliber	Project XT5 / 3 UAS	: (Numbe 0mm Anti	Number/Name) nm Anti-Personnel and Counter						
Product Developme	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 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				
30mm Prototype Design	C/CPFF	General Dynamics : Marion, IL	-	2.475	Jul 2018	2.630	Jan 2019	-		-		-	0.000	5.105	-				
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.124		-		-		-	0.000	0.124	-				
		Subtotal	-	2.475		2.754		-		-		-	0.000	5.229	N/A				
Support (\$ in Million	is)			FY :	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 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	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	-	-		0.350	Dec 2018	-		-		-	0.000	0.350	-				
	L	Subtotal	-	-		0.350		-		-		-	0.000	0.350	N/A				
Test and Evaluation	(\$ in Milli	ons)		FY :	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 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 Readiness Level 6 (TRL6) Demonstration	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		0.750	Aug 2019	-		-		-	0.000	0.750	-				
		Subtotal	-	-		0.750		-		-		-	0.000	0.750	N/A				
			Prior Years	FY	2018	FY	2019	FY : Ba	2020 ase	FY :	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract				
		Project Cost Totals	-	2.475		3.854		-		-		-	0.000	6.329	N/A				
<u>Remarks</u>																			

Appropriation/Budget Activity P-12 rogram Element (Number/Name) Project (Number/Name) De 009359.01 Task and Medium Calible To 3 munition To 3 munition To 3 munition Event Name I 2 3 4 1 1 1 <t< th=""><th>Exhibit R-4, RDT&E Schedule Profile: PB 2020</th><th>) Arm</th><th>у</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>Da</th><th>te: N</th><th>Marc</th><th>h 20</th><th>19</th><th></th><th></th><th></th></t<>	Exhibit R-4, RDT&E Schedule Profile: PB 2020) Arm	у																	Da	te: N	Marc	h 20	19					
FY 2015 FY 2020 FY 2021 FY 2023 FY 2024 FY 2024 FY 2024 FY 2024 FY 2024 FY 2023 FY 2023 FY 2023 FY 2023 FY 2024 FY 2024 <th 2024<="" colspan="2" fy="" t<="" th=""><th colspan="7">Appropriation/Budget Activity 2040 / 4</th><th colspan="12">R-1 Program Element (Number/Name)Project (NPE 0603639A / Tank and Medium CaliberXT5 / 30nAmmunitionUAS</th><th colspan="8">Number/Name) nm Anti-Personnel and Counter</th></th>	<th colspan="7">Appropriation/Budget Activity 2040 / 4</th> <th colspan="12">R-1 Program Element (Number/Name)Project (NPE 0603639A / Tank and Medium CaliberXT5 / 30nAmmunitionUAS</th> <th colspan="8">Number/Name) nm Anti-Personnel and Counter</th>		Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)Project (NPE 0603639A / Tank and Medium CaliberXT5 / 30nAmmunitionUAS												Number/Name) nm Anti-Personnel and Counter							
LVPII Name 1 2 3 4 1	EventNeme		FY	2018		FY	2019		FY 2020				FY	202	1		FY	202	2		FY	202	3		FY :	2024	L		
Technology Maturation and Risk Reduction (TMRR) Contract Award 30mm Prototype Development Technology Readiness Level (TRL) 6 Demonstration Technology Readiness Level (TRL) 6 Demonstration Tec	Event Name	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		
Contract Award 30mm Prototype Development Technology Readiness Level (TRL) 6 Demonstration Technology Readiness Level (TRL) 6 Demonstration Te	Technology Maturation and Risk Reduction (TMRR)	TMF	R.																										
30mm Prototype Development Technology Readiness Level (TRL) 8 Demonstration Technology	Contract Award			Contra	act Awar	±																							
Technology Readiness Level (TRL) 6 Demonstration	30mm Prototype Development			30	mm Pro	totype (Developmer	nt																					
	Technology Readiness Level (TRL) 6 Demonstration																												
							T	RL6 De	mo																				
												L								1				l					

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Mar	ch 2019			
Appropriation/Budget Activity 2040 / 4	e r/Name) Im Caliber	Project (Number/Name) XT5 I 30mm Anti-Personnel and Counter UAS					
So	chedule Details						
	S	art	E	Ind			
Events	Quarter	Year	Quarter	Year			
Technology Maturation and Risk Reduction (TMRR)	1	2018	4	2019			
Contract Award	4	2018	4	2018			
30mm Prototype Development	4	2018	4	2019			
Technology Readiness Level (TRL) 6 Demonstration	4	2019	4	2019			