Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	72.456	100.367	79.873	-	79.873	-	-	-	-	-	-
694: *Medium Caliber Ammunition*	-	-	12.000	-	-	-	-	-	-	-	-	-
BQ4: *155mm Artillery Propulsion XM654*	-	6.904	15.131	-	-	-	-	-	-	-	-	-
CD8: *Long Range Precision Munition (LRPM)*	-	-	-	29.198	-	29.198	-	-	-	-	-	-
EB8: *OWL for Small Caliber Ammunition*	-	1.918	-	-	-	-	-	-	-	-	-	-
EB9: *Aviation Airborne Expendable Countermeasures*	-	3.055	4.332	5.529	-	5.529	-	-	-	-	-	-
EC2: *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*	-	8.572	-	-	-	-	-	-	-	-	-	-
EC3: *Ammunition Logistics Prototyping*	-	1.462	1.650	2.141	-	2.141	-	-	-	-	-	-
FA5: *Assured Precision Weapons and Munitions*	-	29.981	28.788	43.005	-	43.005	-	-	-	-	-	-
FG1: *Cannon-Delivered Area Effects Munitions (C-DAEM)*	-	20.564	38.466	-	-	-	-	-	-	-	-	-

Note

In Fiscal Year (FY) 2022, Project BQ4, 155mm Artillery Propulsion, will transition to Budget Activity 5, Program Element (PE) 0604802A, Weapons and Munitions Engineering Development, Project BQ3, 155mm Artillery Propulsion.
Project FG1, Cannon-Delivered Area Effects Munitions (C-DAEM), will transition to Budget Activity 5, PE 0604802A, Weapons and Munitions Engineering Development, Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM).
Project CD8 / Long Range Precision Munition (LRPM) is a New Start.
Project 694 / Medium Caliber Ammunition has no funding request for FY 2022.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*

A. Mission Description and Budget Item Justification

The Tank and Medium Caliber Ammunition Program Element 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 United States maneuver forces against the full range of modern battlefield threats. To achieve this, Tank and Medium Caliber Ammunition projects will identify and develop promising technologies through competitive development and streamlined acquisition procedures.

Project 694 Medium Caliber Ammunition: Medium Caliber Ammunition supports development of Multi-Mode Proximity-Fuzed 30 millimeter (mm) munition capable of defeating materiel, personnel, and Unmanned Aerial Systems (UAS) threats. This capability supports the Initial Maneuver Short Range Air Defense (IM-SHORAD) directed requirement and is endorsed by the Air and Missile Defense Cross-Functional Team (AMD CFT). This effort will miniaturize and mature critical technologies in preparation to enter Engineering &Manufacturing Development (EMD). Critical technologies include proximity airburst fuzing, guidance and navigation, communication with fire control, and advanced lethality. There is no FY 2022 funding request.

Project BQ4 155mm Artillery Propulsion: Supercharge is a stand-alone top-zone 155 millimeter (mm) propelling charge required to achieve maximum range requirements from the XM1299 Increment 1C and XM1299A1 Increment 2 Extended Range Cannon Artillery (ERCA) Self-Propelled Howitzer (SPH). It will achieve lethality overmatch out to 70 kilometers (km) with developmental extended range projectiles, and will potentially increase range with compatible legacy projectiles up to thirty percent. Supercharge is composed of an earlier bag variant and later combustible cartridge case (foamed celluloid or felted fiber technology), integral metal Stub Case, electrically initiated primer, and advanced artillery propellant. There is no FY 2022 budget request. In FY 2022, this project transitions to Budget Activity 05; Program Element (PE) 0604802A, Weapons and Munitions - Engineering Development, Project BQ4, 155mm Artillery Propulsion.

Project CD8 - Army Aviation long range munition dominance and asymmetric advantage has eroded in recent years with peer adversaries expanding their capabilities by developing and fielding advanced systems designed to create physical stand-off especially in the realm of Anti-Access Area Denial (A2AD) and Integrated Air Defense Systems (IADS). Having operated in relatively uncontested environments for a number of years, the Joint Force has not kept pace with these peer and near peer developments and U.S. dominance is no longer assured. Army Aviation requires a Long Range Precision Munition (LRPM) that is integrated with the firing platform that can provide leap ahead capability in the penetration and dis-integration phases of Joint All Domain Operations (JADO). LRPM will provide Army Aviation with an improved long range munition system that can rapidly respond in a combat environment in order to improve the survivability of the warfighters and weapon systems, including aviation platforms in an A2AD and positioning, navigation, and timing (PNT) denied environment. The ability to interoperate and coordinate with other weapon systems and munitions at long ranges and adapt to changing threats is a core concept of the Army Aviation Weapons, Sub-Systems, and Munitions Initial Capabilities Document validated in June 2018. LRPM will leverage a modular open system architecture to facilitate a reduction of costs and rapid development as threats continue to evolve.

Project EB8 OWL for Small Caliber: The OWL project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 caliber munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL project's objective is to develop and field a full 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, and increasing

lethality by incorporating Enhanced Performance Round (EPR) technology into the new tracer ammunition. 7.62mm and 5.56mm are the immediate focus followed by a similar development strategy for .50 caliber cartridges. There is no Fiscal Year (FY) 2022 funding request.

Project EB9 Project EB9 Aviation Airborne Expendable Countermeasure (AAECM) supports the advanced development activities and technology demonstrations of the AAECM to include the XM215 Flare and XM20 Radio Frequency (RF) expendables. These expendable countermeasures systems are essential parts for Army aircraft and will be employed with currently fielded countermeasures as a cocktail to provide protection against all threats. Army Research Development Technology & Evaluation (RDT&E) efforts are coordinated with Program Executive Office (PEO) Aviation to address the AAECM capability, a critical Aircraft Survivability Equipment (ASE) enabler for enduring aircraft and the Future Vertical Lift (FVL) Cross Functional Team (CFT) within the Army's top modernization priorities.

These advanced decoys will address deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. This program will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will demonstrate component and subsystem maturity prior to integration into major Army aircraft platforms. FY 2022 supports final developmental and initial operational testing for the XM20 RF Countermeasures (CM) ahead of the planned Milestone C in FY 2022.

Project EC2 ADVAP: The Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Family of Ammunition Capabilities Development Documents (CDD) 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 the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. New ADVAP ammunition is designed to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.

The Next Generation Squad Weapons (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) ammunition to defeat hard targets. There is no Fiscal Year (FY) 2022 funding request.

Project EC3 Ammunition Logistics Prototyping: 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. Fiscal Year (FY) 2022 funding will be used to further mature munition health monitoring devices in accordance with the needs of the relevant PMs. However, the preponderance of the funding will be used to directly to support Long Range Precision Fire (LRPF) munition health monitoring requirements throughout its resupply process. Specifically, the funding will be used to address munition health monitoring and packaging/preservation of munitions within the tactical movement of large caliber ammunition.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
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 *I Tank and Medium Caliber Ammunition*

Project FA5 Assured Precision Weapons and Munitions (APWM): The APWM 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 (SoS) environment. The APWM Project reinforces the National Defense Strategy's major lines of effort through technology development and prototyping, which increases lethality and ensures future combat overmatch success of the Joint Force against peer/near-peer adversaries. This project also aims to improve 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 Global Positioning System (GPS) coordinated efforts. The APWM Project directly supports top Army Modernization Priorities via the Assured-PNT (A-PNT) and Long Range Precision Fires (LRPF) Cross Functional Team (CFT) imperatives 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, Army's PNT related programs, and A-PNT/Space CFT programs in support of LRPF and Counter Anti-Access/Area Denial (A2/AD) missions. Funding will also enable component and subsystem architecture input essential for Precision Weapons and Munitions (PW&M) operating in a Navigation Warfare (NavWar) SoS environment, Army M-Code GPS technology integration and evaluation, planning and evaluating next generation M-Code GPS to validate capability for future Joint precision munitions, and maturation of alternative PNT and NavWar related technologies and solutions to enable informed A-PNT related PoR milestone and Army cross-functional modernization decisions.

Project FG1 Cannon-Delivered Area Effects Munitions (C-DAEM) Project will provide United States (U.S). ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018 to inform Army acquisition and investment decisions regarding replacement of the current stockpile of 155 millimeter (mm) Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense (DoD) policy compliant munitions and address anti-armor and extended range capability requirements. The Army validated two materiel solutions for C-DAEM to be pursued in parallel. C-DAEM Armor (Increment 1) will destroy moved and moving infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM DPICM Replacement (Increment 2) will destroy personnel to light-skinned vehicles. There is no FY 2022 budget request.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	77.696	92.753	39.193	-	39.193
Current President's Budget	72.456	100.367	79.873	-	79.873
Total Adjustments	-5.240	7.614	40.680	-	40.680
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	12.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.044	-			
• SBIR/STTR Transfer	-3.196	-3.386			
• Adjustments to Budget Years	-	-	40.680	-	40.680

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
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 *I Tank and Medium Caliber Ammunition*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 694: *Medium Caliber Ammunition*		
Congressional Add: *Development of Guided / Proximity Airburst Munition*	-	12.000
Congressional Add Subtotals for Project: 694	-	12.000
Congressional Add Totals for all Projects	-	12.000

Change Summary Explanation

FY 2022 Program Element (PE) 0603639A Tank and Medium Caliber Ammunition is a mix of decreases and increases. There are slight increases on EB9 and EC3 and a large increase on FA5 for the PGM Software-Defined Receiver (SDRx). Overall the decrease is largely due to BQ4 transitioning to BA5 BQ3 155mm Artillery Propulsion.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) 694 / *Medium Caliber Ammunition*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
694: *Medium Caliber Ammunition*	-	-	12.000	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

There is no Fiscal Year (FY) 2022 funding request.

A. Mission Description and Budget Item Justification

Project 694 Medium Caliber Ammunition supports development of Multi-Mode Proximity-Fuzed 30 millimeter (mm) munition capable of defeating materiel, personnel, and Unmanned Aerial Systems (UAS) threats. This capability supports the Initial Maneuver Short Range Air Defense (IM-SHORAD) directed requirement and is endorsed by the Air and Missile Defense Cross-Functional Team (AMD CFT). This effort will miniaturize and mature critical technologies in preparation to enter Engineering &Manufacturing Development (EMD). Critical technologies include proximity airburst fuzing, guidance and navigation, communication with fire control, and advanced lethality.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: Development of Guided / Proximity Airburst Munition	-	12.000
FY 2021 Plans: Design, development, and maturation critical technologies that will conclude with a prototype demonstration.		
Congressional Adds Subtotals	-	12.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Other Transaction Agreement (OTA) contracts will be utilized for development, maturation and prototyping of critical fuzing and guidance technologies.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) 694 / *Medium Caliber Ammunition*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Prototype Hardware	C/CPFF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	-	-		9.800	Mar 2021	-		-		-	0.000	9.800	-
		Subtotal	-	-		9.800		-		-		-	0.000	9.800	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny, NJ	-	-		2.000	Mar 2021	-		-		-	0.000	2.000	-
		Subtotal	-	-		2.000		-		-		-	0.000	2.000	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Aberdeen Test Center	MIPR	Aberdeen Proving Ground : Aberdeen, MD	-	-		0.200	Jun 2021	-		-		-	0.000	0.200	-
		Subtotal	-	-		0.200		-		-		-	0.000	0.200	N/A

	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		12.000		-		-		-	0.000	12.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** 694 / *Medium Caliber Ammunition*

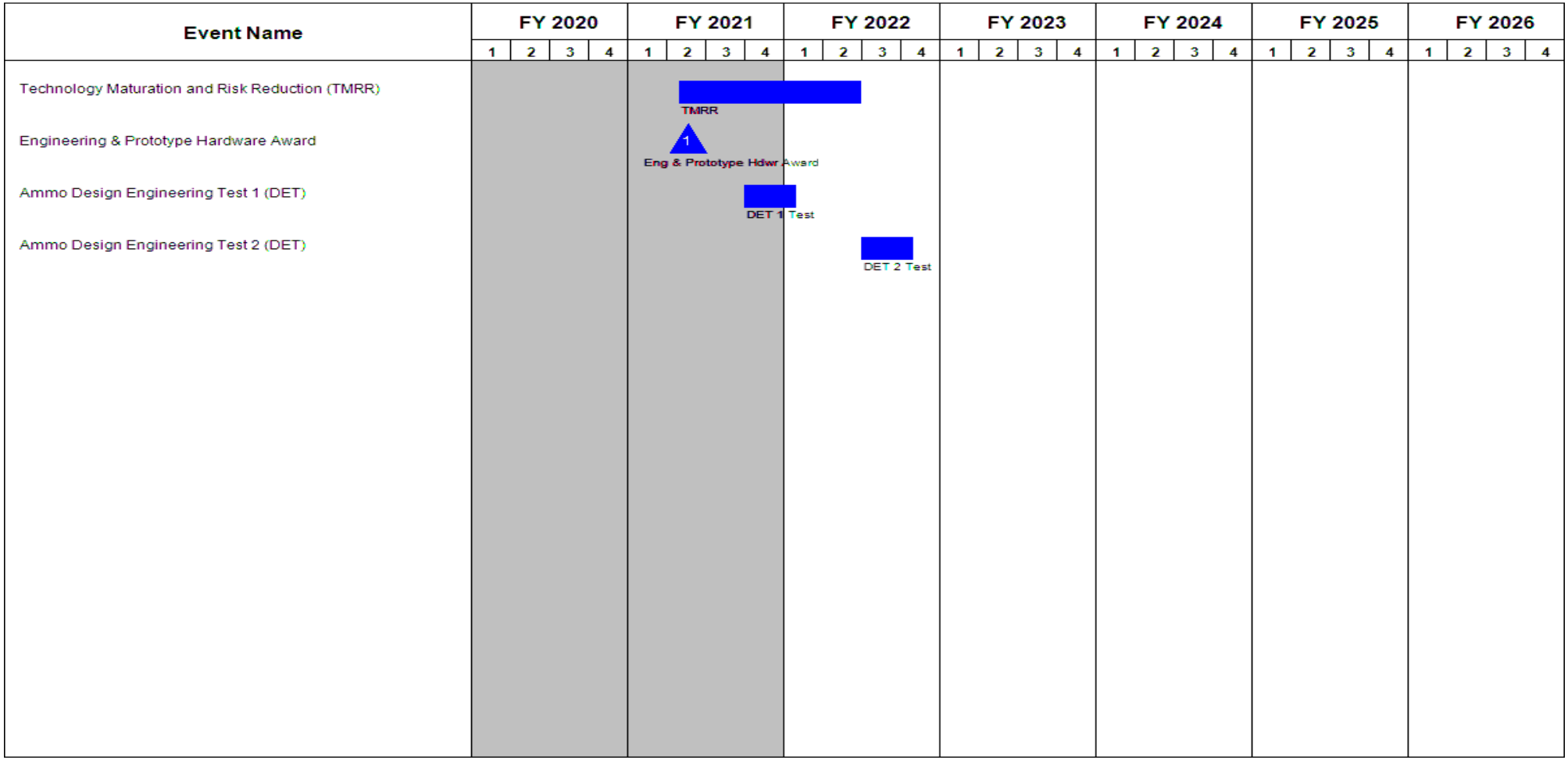

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** 694 / *Medium Caliber Ammunition*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Technology Maturation and Risk Reduction (TMRR)	2	2021	2	2022
Engineering & Prototype Hardware Award	2	2021	2	2021
Ammo Design Engineering Test 1 (DET)	4	2021	1	2022
Ammo Design Engineering Test 2 (DET)	3	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) BQ4 / *155mm Artillery Propulsion XM654*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BQ4: *155mm Artillery Propulsion XM654*	-	6.904	15.131	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year (FY) 2022, Project BQ4, 155mm Artillery Propulsion, will transition to Budget Activity 5, Program Element (PE) 0604802A, Weapons and Munitions Engineering Development, Project BQ3, 155mm Artillery Propulsion. There is no FY 2022 request for Project BQ4.

A. Mission Description and Budget Item Justification

Supercharge is a stand-alone top-zone 155 millimeter (mm) propelling charge required to achieve maximum range requirements from the XM1299A1 Extended Range Cannon Artillery (ERCA) Self-Propelled Howitzer (SPH). It will achieve lethality overmatch out to 70 kilometers (km) with developmental extended range projectiles, and will increase range with legacy projectiles by thirty percent. Supercharge is composed of combustible cartridge case (foamed celluloid or felted fiber technology), integral metal Stub Case, electrically initiated primer, and advanced artillery propellant. There is no FY 2022 budget request.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: 155mm Artillery Propulsion Supercharge	6.904	15.131	-
Description: Unitary top-zone propelling charge for XM907E2 Extended Range Cannon with Slide-block breech for use with ERCA Increased Range (formerly Increments 1C) and ERCA Increased Rate of Fire (formerly Increment 2) to gain range overmatch for 155mm artillery. ***FY 2021 Plans:*** FY 2021 funding will continue the support of concurrent design risk reduction and prototype maturation efforts for two Supercharge variants (2-piece bag and cased) to support the acceleration of ERCA Increased Range (formerly Increment 1C) and ERCA Increased Rate of Fire (formerly Increment 2) with automated loading system. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 decrease in funding due to Project BQ4 transition to Budget Activity 5, Project BQ3, 155mm Artillery Propulsion.			
Accomplishments/Planned Programs Subtotals	6.904	15.131	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** BQ4 / *155mm Artillery Propulsion XM654*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BQ3: *155mm Artillery Propulsion XM654*	-	-	34.461	-	34.461	-	-	-	-	-	-

Remarks

In FY 2022, this Project will transition to Budget Activity 05, Program Element (PE) 0604802A Weapons and Munitions - Eng Dev Project BQ3 155mm Artillery Propulsion XM654. A Procurement of Ammunition, Army (PAA) funding line, Standard Study Number E99350, was established for transition to procurement FY 2022.

D. Acquisition Strategy

The Supercharge Project will consist of critical technology prototyping, testing, and demonstration of two variants: (1) the Supercharge 2-piece Bag configuration to support the acceleration of the Extended Range Cannon Artillery (ERCA) Increased Range to achieve lethality at 70km and greater with precision accuracy by FY 2023, and (2) the Supercharge Cased to support ERCA Increased Rate of Fire (IRF) with added automated loading system at a date to be determined. 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.

In FY 2022, the Supercharge 2-piece Bag will complete qualification testing and transition to procurement of Safety Release quantities for First Unit Issued (FUI) of ERCA Increased Range in FY 2023 to support Operational Assessment during FY 2024. Federal Acquisition Regulation (FAR) based production contract(s) will be awarded for Urgent Materiel Release (UMR) and Full Materiel Release (FMR).

The Cased Supercharge will require additional technology maturation, system integration, developmental testing and qualification for UMR to support ERCA IRF. FAR based production contract(s) will be awarded for FMR.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** BQ4 / *155mm Artillery Propulsion XM654*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total 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	-	0.053	Jan 2020	0.050	Oct 2020	-		-		-	0.000	0.103	-
		Subtotal	-	0.053		0.050		-		-		-	0.000	0.103	N/A

Remarks

Program Management reflects Supercharge travel and milestone documentation support.

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Supercharge Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	4.106	May 2020	8.756	Nov 2020	-		-		-	0.000	12.862	-
Developmental Projectile/ Fuze Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		1.100	Nov 2020	-		-		-	0.000	1.100	-
		Subtotal	-	4.106		9.856		-		-		-	0.000	13.962	N/A

Remarks

FY 2021 increase to support prototype maturation of two Supercharge variants to support Army modernization requirements to achieve lethality at 70 kilometers (km) with precision accuracy by FY 2023.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) BQ4 / *155mm Artillery Propulsion XM654*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	-	1.528	Jan 2020	2.125	Nov 2020	-		-		-	0.000	3.653	-
		Subtotal	-	1.528		2.125		-		-		-	0.000	3.653	N/A

Remarks

Engineering support required for ongoing design risk reduction and prototype maturation efforts of two Supercharge variants.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Supercharge Prototype Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	1.217	Mar 2020	3.100	Feb 2021	-		-		-	0.000	4.317	-
		Subtotal	-	1.217		3.100		-		-		-	0.000	4.317	N/A

Remarks

Additional FY 2021 testing activities required for ongoing design risk reduction and prototype maturation efforts of two Supercharge variants.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	6.904		15.131		-		-		-	0.000	22.035	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** BQ4 / *155mm Artillery Propulsion XM654*

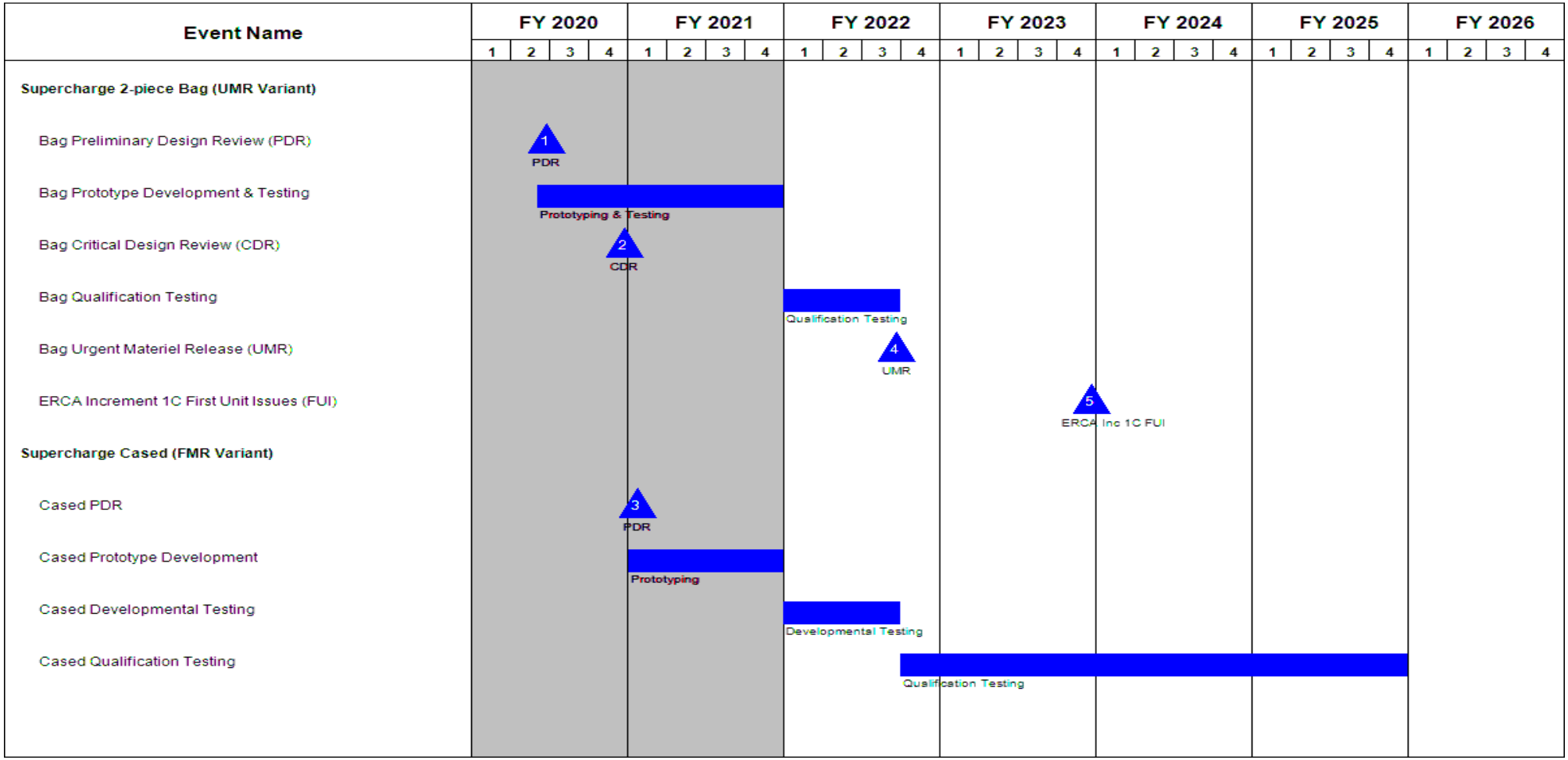

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** BQ4 / *155mm Artillery Propulsion XM654*

Note

Schedule reflects design risk reduction and prototype maturation efforts for two parallel Supercharge variants (2-piece bag and cased) required to support the concurrent development of the Extended Range Cannon Artillery (ERCA) Increased Range (accelerated to achieve precision accuracy at 70km range by FY 2023) and ERCA Increased Rate of Fire (with added automated loading system).

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** BQ4 / *155mm Artillery Propulsion XM654*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Supercharge 2-piece Bag (UMR Variant)	1	2020	3	2022
Bag Preliminary Design Review (PDR)	2	2020	2	2020
Bag Prototype Development & Testing	2	2020	4	2021
Bag Critical Design Review (CDR)	4	2020	4	2020
Bag Qualification Testing	1	2022	3	2022
Bag Urgent Materiel Release (UMR)	3	2022	3	2022
ERCA Increment 1C First Unit Issues (FUI)	4	2023	4	2023
Supercharge Cased (FMR Variant)	1	2020	4	2025
Cased PDR	1	2021	1	2021
Cased Prototype Development	1	2021	4	2021
Cased Developmental Testing	1	2022	3	2022
Cased Qualification Testing	4	2022	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) CD8 / *Long Range Precision Munition (LRPM)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CD8: *Long Range Precision Munition (LRPM)*	-	-	-	29.198	-	29.198	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2022.

Project CD8 / Long Range Precision Munition (LRPM) is a New Start for Fiscal Year (FY) 2022.

A. Mission Description and Budget Item Justification

Army Aviation long range munition dominance and asymmetric advantage has eroded in recent years with peer adversaries expanding their capabilities by developing and fielding advanced systems designed to create physical stand-off especially in the realm of Anti-Access Area Denial (A2AD) and Integrated Air Defense Systems (IADS). Having operated in relatively uncontested environments for a number of years, the Joint Force has not kept pace with these peer and near peer developments and U.S. dominance is no longer assured. Army Aviation requires a Long Range Precision Munition (LRPM) that is integrated with the firing platform that can provide leap ahead capability in the penetration and dis-integration phases of Joint All Domain Operations (JADO). LRPM will provide Army Aviation with an improved long range munition system that can rapidly respond in a combat environment in order to improve the survivability of the warfighters and weapon systems, including aviation platforms in an A2AD and positioning, navigation, and timing (PNT) denied environment. The ability to interoperate and coordinate with other weapon systems and munitions at long ranges and adapt to changing threats is a core concept of the Army Aviation Weapons, Sub-Systems, and Munitions Initial Capabilities Document validated in June 2018. LRPM will leverage a modular open system architecture to facilitate a reduction of costs and rapid development as threats continue to evolve.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Long Range Precision Munition	-	-	29.198
Description: This line funds the demonstration and validation of a munition system that will engage and render desired lethal effects on targets at ranges beyond line of sight using open system architecture. The LRPM development effort includes demonstration and validation of precision guided munitions with the capability to complete the assigned mission in environments that could include cyber-attack, countermeasures, counter precision guided munition systems and anti-access area denial environments. These efforts will include technical assessments, concept studies, perform risk reduction efforts, technology maturation, engineering design, engineering / manufacturing development, test, demonstration of prototype hardware, integration and document preparation for integration of the LRPM and associated contract efforts.			
FY 2022 Plans: 1. Initiate technology maturation and risk reduction efforts including an Industry capabilities demonstration. 2. Evaluate industry concepts utilizing test scoring criteria and laboratory analysis.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** CD8 / *Long Range Precision Munition (LRPM)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
3. Prepare program acquisition and contract documentation. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** New Start. Significant ramp in funding required to execute demonstration event and prepare for award of developmental contract.			
Accomplishments/Planned Programs Subtotals	-	-	29.198

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The LRPM Program will explore and leverage industry's ability to deliver an LRPM solution through a Shoot-Off capability demonstration. Selected vendors will deliver test assets in support of a United States Government Test in 4QTR FY 2022. This demonstration will illustrate their design concepts and technical approaches to inform the LRPM Capability Development Document (CDD). Following the LRPM Shoot-Off capability demonstration event, the Army will select one or more vendors for refinement, maturation, and qualification of the weapon system. A planned contract award in 4QTR FY 2023 will mature and qualify the LRPM system.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) CD8 / *Long Range Precision Munition (LRPM)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering/ Program Management	MIPR	Various Performers : Various	-	-		-		2.560	Nov 2021	-		2.560	0.000	2.560	-
		Subtotal	-	-		-		2.560		-		2.560	0.000	2.560	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LRPM Other Government Agency	MIPR	CCDC Redstone Arsenal, AL : Various	-	-		-		3.410	Nov 2021	-		3.410	0.000	3.410	-
		Subtotal	-	-		-		3.410		-		3.410	0.000	3.410	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Demonstration Testing	MIPR	To Be Determined : To Be Determined	-	-		-		17.732	Jan 2022	-		17.732	0.000	17.732	-
LRPM Other Government Agency	MIPR	Various Performers : Various	-	-		-		5.496	Nov 2021	-		5.496	0.000	5.496	-
		Subtotal	-	-		-		23.228		-		23.228	0.000	23.228	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		29.198		-		29.198	0.000	29.198	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** CD8 / *Long Range Precision Munition (LRPM)*

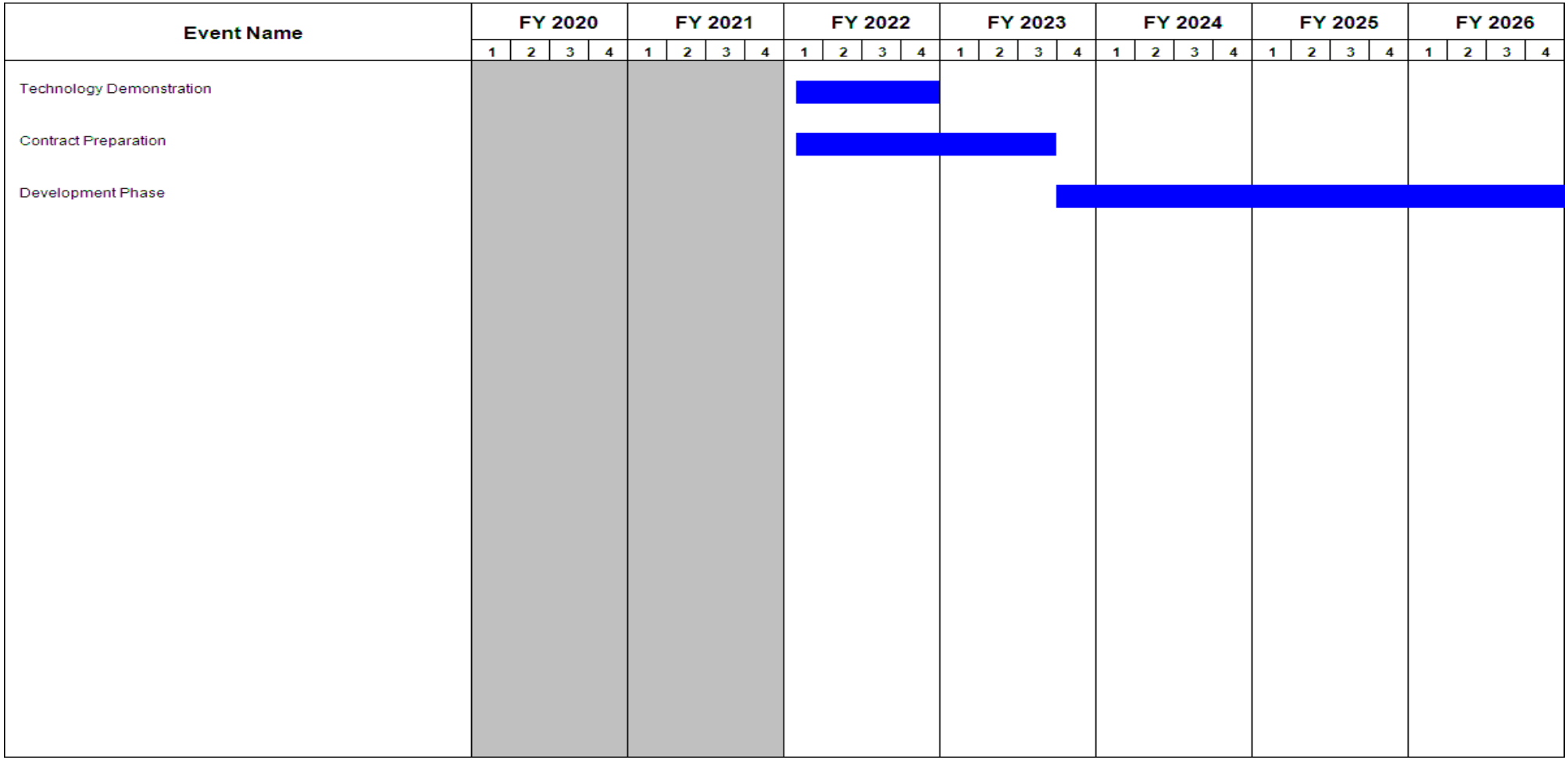

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** CD8 / *Long Range Precision Munition (LRPM)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Technology Demonstration	1	2022	4	2022
Contract Preparation	1	2022	3	2023
Development Phase	4	2023	3	2028

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EB8 / *OWL for Small Caliber Ammunition*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EB8: *OWL for Small Caliber Ammunition*	-	1.918	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The OWL project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 caliber munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL project's objective is to develop and field a full 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, and increasing lethality by incorporating Enhanced Performance Round (EPR) technology into the new tracer ammunition. 7.62mm and 5.56mm are the immediate focus followed by a similar development strategy for .50 caliber cartridges. There is no Fiscal Year (FY) 2022 funding request.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Technology Maturation and Risk Reduction (TMRR) ***Description:*** OWL will develop and demonstrate a full tracer technology that eliminates the shortcomings of current legacy tracers.	1.918	-	-
Accomplishments/Planned Programs Subtotals	1.918	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• EP4: *One-Way Luminescence for Small Caliber Ammo*	8.195	13.467	6.896	-	6.896	-	-	-	-	-	-

Remarks

Project EB8 OWL for Small Caliber funding transitioned to BA 5 PE 0604802A Weapons and Munitions - Eng Dev Weapons and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.

D. Acquisition Strategy

The OWL technology will be integrated into the M80A1 trace ammunition production. The OWL concept will be developed through Government and Industry prototyping efforts. Technology Readiness Assessments (TRAs) were conducted in FY 2017 and FY 2018 to evaluate the Industry and Government concepts in order to proceed

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB8 / *OWL for Small Caliber Ammunition*

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 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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EB8 / *OWL for Small Caliber Ammunition*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Tooling Development	Option/ CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	0.780	0.886	Feb 2020	-		-		-		-	0.000	1.666	Continuing
Prototype Development Contract 1	Option/ CPFF	General Dynamics : Florham Park, NJ	0.515	-		-		-		-		-	0.000	0.515	Continuing
Prototype Development Contract 2	Option/ CPFF	Nammo Tally : Mesa, AZ	0.515	-		-		-		-		-	0.000	0.515	Continuing
		Subtotal	1.810	0.886		-		-		-		-	0.000	2.696	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny, NJ	6.608	0.872	Oct 2019	-		-		-		-	2.498	9.978	Continuing
Development Support	Option/ FFP	Leidos Inc. : Reston, VA	0.068	-		-		-		-		-	0.000	0.068	-
		Subtotal	6.676	0.872		-		-		-		-	2.498	10.046	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Research Lab (ARL)	MIPR	Army Research Lab (ARL) : Aberdeen, MD	0.278	0.100	Oct 2019	-		-		-		-	1.500	1.878	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EB8 / *OWL for Small Caliber Ammunition*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
US Army Aberdeen Test Center (ATC)	MIPR	US Army Aberdeen Test Center (ATC) : Aberdeen, MD	0.101	0.060	Oct 2019	-		-		-		-	0.000	0.161	-
Army Corps of Engineers	MIPR	Army Corps of Engineers : Vicksburg, MO	0.388	-		-		-		-		-	1.500	1.888	Continuing
Army Joint Munitions Command	MIPR	Army Joint Munitions Command : Rock Island, IL	0.204	-		-		-		-		-	0.000	0.204	-
Prototype testing	Option/ FFP	Double B Enterprises : Malvern, IA	0.200	-		-		-		-		-	0.000	0.200	Continuing
		Subtotal	1.171	0.160		-		-		-		-	3.000	4.331	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	9.657	1.918		0.000		-		-		-	5.498	17.073	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB8 / *OWL for Small Caliber Ammunition*

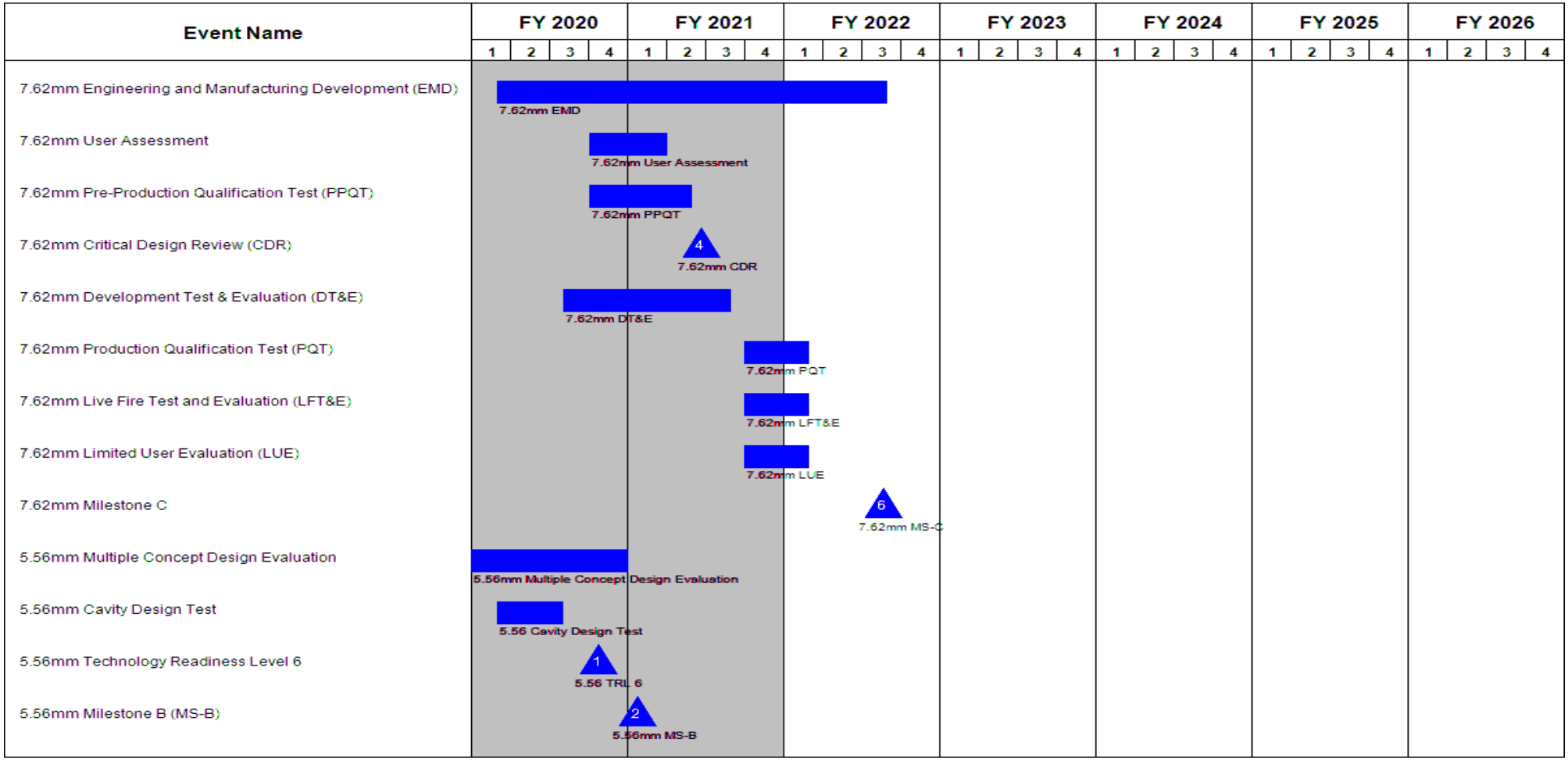

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB8 / *OWL for Small Caliber Ammunition*

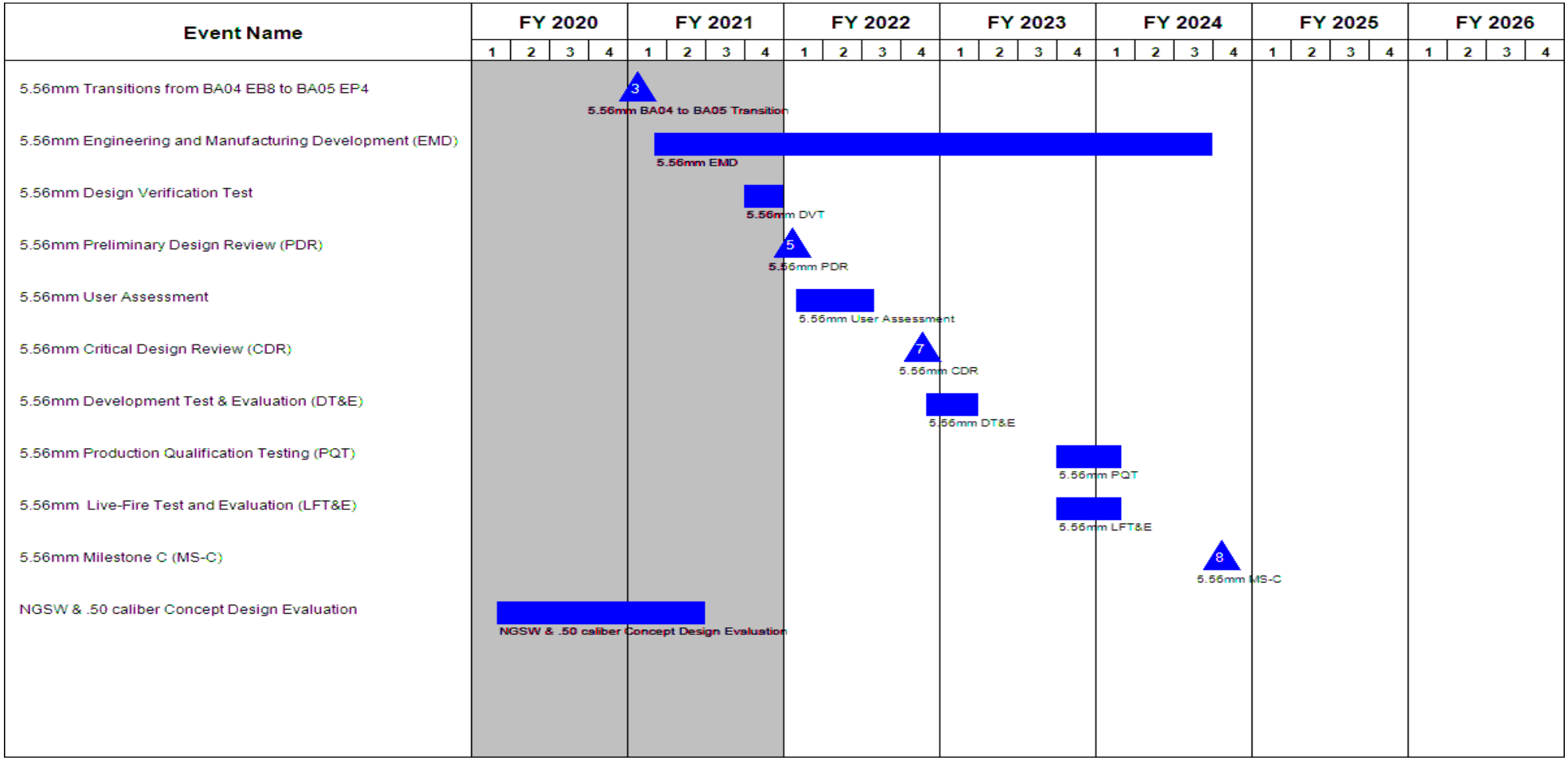

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB8 / *OWL for Small Caliber Ammunition*

Schedule Details

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

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB8 / *OWL for Small Caliber Ammunition*

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
5.56mm Engineering and Manufacturing Development (EMD)	1	2021	3	2024
5.56mm Design Verification Test	4	2021	4	2021
5.56mm Preliminary Design Review (PDR)	1	2022	1	2022
5.56mm User Assessment	1	2022	3	2022
5.56mm Critical Design Review (CDR)	4	2022	4	2022
5.56mm Development Test & Evaluation (DT&E)	4	2022	1	2023
5.56mm Production Qualification Testing (PQT)	4	2023	1	2024
5.56mm Live-Fire Test and Evaluation (LFT&E)	4	2023	1	2024
5.56mm Milestone C (MS-C)	4	2024	4	2024
NGSW & .50 caliber Concept Design Evaluation	1	2020	2	2021

Note

As the technology matures, Project EB8 One-Way Luminescence (OWL) for Small Caliber funding transitioned to Budget Activity (BA) 5 Program Element (PE) 0604802A Weapons and Munitions - Eng Dev Weapons and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EB9 / *Aviation Airborne Expendable Countermeasures*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EB9: *Aviation Airborne Expendable Countermeasures*	-	3.055	4.332	5.529	-	5.529	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

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

A. Mission Description and Budget Item Justification

Project EB9 Aviation Airborne Expendable Countermeasure (AAECM) supports the advanced development activities and technology demonstrations of the AAECM to include the XM215 Flare and XM20 Radio Frequency (RF) expendables. These expendable countermeasures systems are essential parts for Army aircraft and will be employed with currently fielded countermeasures as a cocktail to provide protection against all threats. Army Research Development Technology & Evaluation (RDT&E) efforts are coordinated with Program Executive Office (PEO) Aviation to address the AAECM capability, a critical Aircraft Survivability Equipment (ASE) enabler for enduring aircraft and the Future Vertical Lift (FVL) Cross Functional Team (CFT) within the Army's top modernization priorities.

These advanced decoys will address deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. This program will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will demonstrate component and subsystem maturity prior to integration into major Army aircraft platforms. FY 2022 supports final developmental and initial operational testing for the XM20 RF Countermeasures (CM) ahead of the planned Milestone C in FY 2022.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Expendable Countermeasures to Guided Missile Threats	3.055	4.332	5.529
Description: This program will develop expendable countermeasure decoys which will protect Army aircraft from surface-to-air missiles.			
FY 2021 Plans: Complete final XM20 Technology Maturation & Risk Reduction (TMRR) efforts and transition into Engineering and Manufacturing Development activities, conduct flight testing and Modeling and Simulation efforts.			
FY 2022 Plans: Finalize XM20 flight testing and conduct initial operational test and evaluation to support the Milestone C decision.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB9 / *Aviation Airborne Expendable Countermeasures*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Increase in funding in FY 2022 is due to the final developmental and operational testing that will be conducted in FY 2022.			
Accomplishments/Planned Programs Subtotals	3.055	4.332	5.529

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• EP7: *Aviation Airborne Expendable Countermeasures*	4.717	4.313	7.526	-	7.526	-	-	-	-	-	-

Remarks

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

D. Acquisition Strategy

During the Materiel Solution Analysis (MSA), Milestone A phase, prototypes developed by the US Government (USG) and contractors were tested and evaluated against initial CDD requirements. The contractor developed XM20 design and the USG developed XM215 design were selected to enter into Engineering and Manufacturing Development (EMD), Milestone B phase, to finalize the design based on lessons learned from the MSA flight test and CDD requirements. The USG starts the transition to industry via Other Transaction Authority (OTA) contract mechanism in FY 2021. Industry prototypes will undergo Developmental and Operational Testing and final XM215 and XM20 configurations to support Milestone C in FY 2022.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EB9 / *Aviation Airborne Expendable Countermeasures*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
XM20 Testing Hardware	C/FFP	TBD : TBD	-	-		-		1.350	Oct 2021	-		1.350	0.000	1.350	-
XM20 Development	C/FFP	Armtec : Lillington, NC	1.560	1.131	Oct 2020	-		-		-		-	0.000	2.691	-
XM215 Development	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	3.532	-		-		-		-		-	0.000	3.532	-
		Subtotal	5.092	1.131		-		1.350		-		1.350	0.000	7.573	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
XM20 Engineering Support	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	0.650	0.530	Aug 2020	0.770	Feb 2021	0.789	Oct 2021	-		0.789	0.000	2.739	-
XM20 Contractor Support	C/FFP	Booz Allen Hamilton : Aberdeen, MD	-	-		0.106	Apr 2021	0.175	Nov 2021	-		0.175	0.000	0.281	-
XM20 Engineering Support	MIPR	DEVCOM C5ISR : Aberdeen Proving Ground, MD	-	0.222	May 2020	-		-		-		-	0.000	0.222	-
		Subtotal	0.650	0.752		0.876		0.964		-		0.964	0.000	3.242	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
XM20 Operational Test and Evaluation	MIPR	Various : Various	-	-		-		3.215	Mar 2022	-		3.215	0.000	3.215	-
XM20 Design Verification and Flight Testing	MIPR	Various : Various	-	0.739	Jan 2021	3.274	Jul 2021	-		-		-	0.000	4.013	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EB9 / *Aviation Airborne Expendable Countermeasures*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
XM20 Modeling & Simulation	C/FFP	Booz Allen Hamilton : McLean, VA	1.072	0.433	May 2020	0.182	Apr 2021	-		-		-	0.000	1.687	-
XM215 Flight Test and Evaluation	MIPR	Various : Various	4.200	-		-		-		-		-	0.000	4.200	-
XM20 Flight Test and Evaluation	MIPR	Various : Various	2.560	-		-		-		-		-	0.000	2.560	-
		Subtotal	7.832	1.172		3.456		3.215		-		3.215	0.000	15.675	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	13.574	3.055		4.332		5.529		-		5.529	0.000	26.490	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB9 / *Aviation Airborne Expendable Countermeasures*

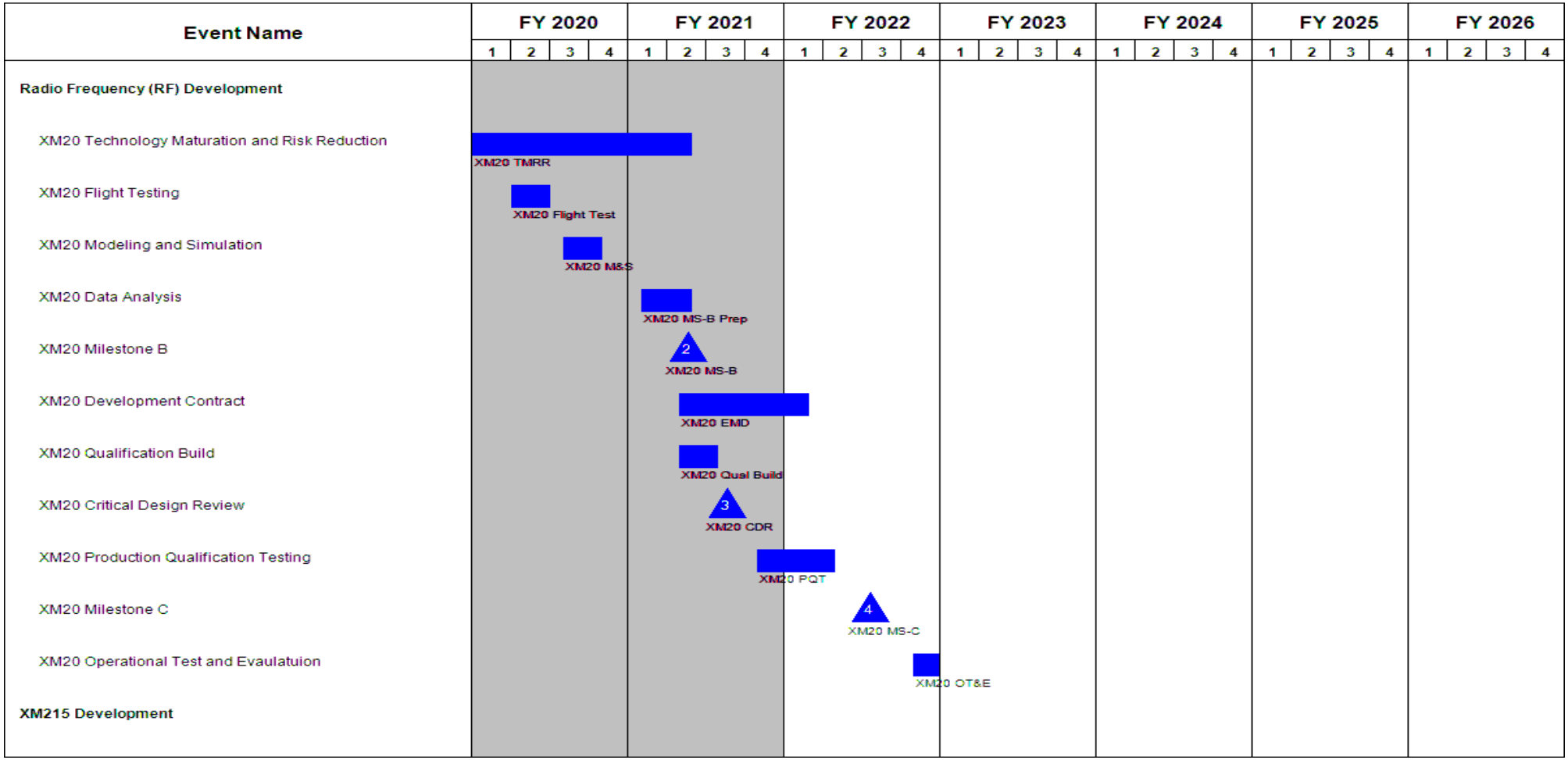

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB9 / *Aviation Airborne Expendable Countermeasures*

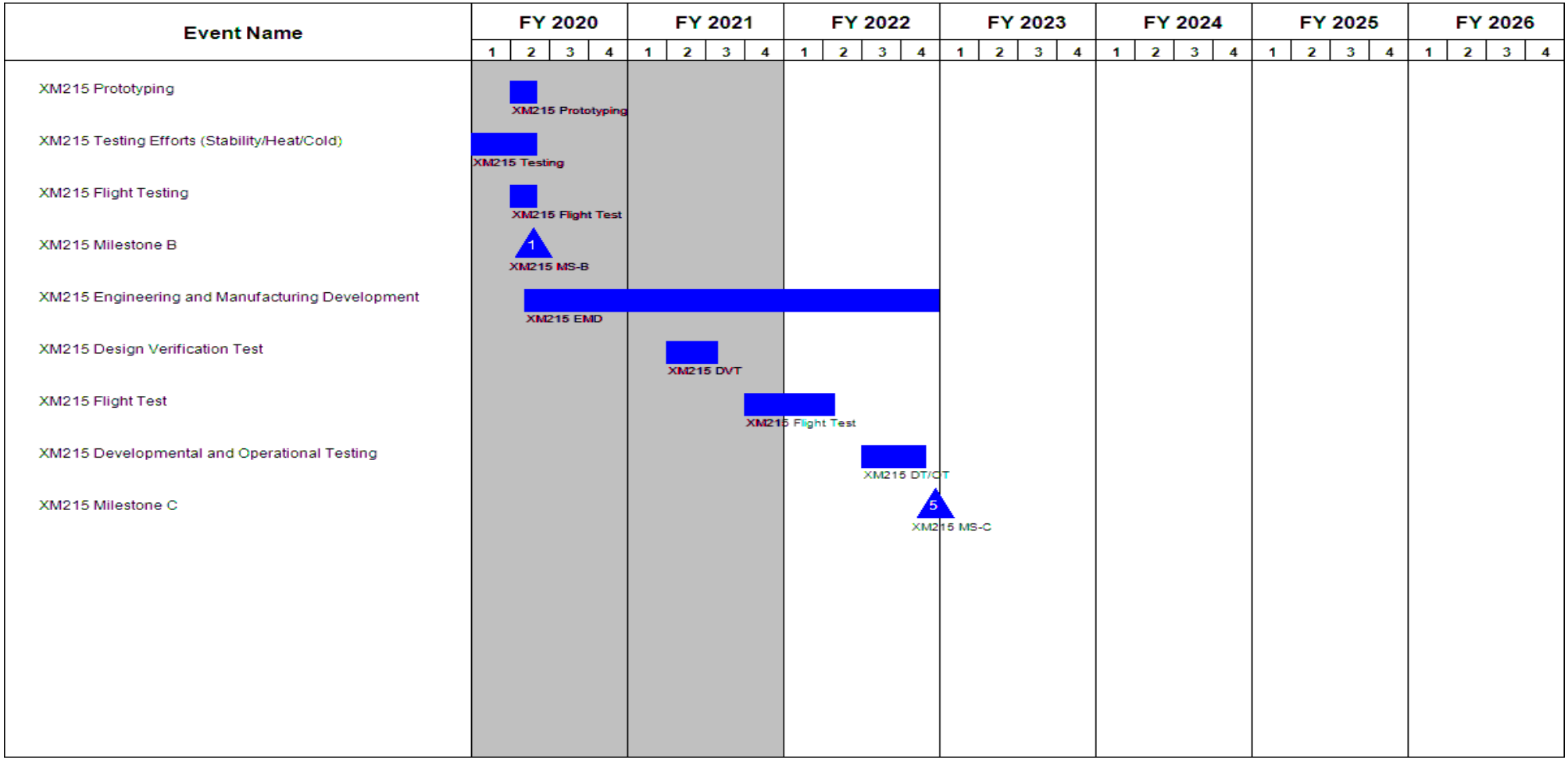

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB9 / *Aviation Airborne Expendable Countermeasures*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Radio Frequency (RF) Development	1	2019	4	2025
XM20 Milestone A	1	2019	1	2019
XM20 Prototype Development	1	2019	4	2019
XM20 Demonstrations	2	2019	3	2019
XM20 Technology Maturation and Risk Reduction	1	2020	2	2021
XM20 Flight Testing	2	2020	2	2020
XM20 Modeling and Simulation	3	2020	4	2020
XM20 Data Analysis	1	2021	2	2021
XM20 Milestone B	2	2021	2	2021
XM20 Development Contract	2	2021	1	2022
XM20 Qualification Build	2	2021	3	2021
XM20 Critical Design Review	3	2021	3	2021
XM20 Production Qualification Testing	4	2021	2	2022
XM20 Milestone C	3	2022	3	2022
XM20 Operational Test and Evaulatuion	4	2022	4	2022
XM215 Development	1	2019	4	2025
XM215 Milestone A	1	2019	1	2019
XM215 Prototyping	1	2019	2	2020
XM215 Down Select	3	2019	3	2019
XM215 Testing Efforts (Stability/Heat/Cold)	3	2019	2	2020
XM215 Flight Testing	1	2020	2	2020
XM215 Milestone B	2	2020	2	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EB9 / *Aviation Airborne Expendable Countermeasures*

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
XM215 Engineering and Manufacturing Development	2	2020	4	2022
XM215 Design Verification Test	2	2021	3	2021
XM215 Flight Test	4	2021	2	2022
XM215 Developmental and Operational Testing	3	2022	4	2022
XM215 Milestone C	4	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EC2 / *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EC2: *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*	-	8.572	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Family of Ammunition Capabilities Development Documents (CDD) 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 the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. New ADVAP ammunition is designed to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.

The Next Generation Squad Weapons (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) ammunition to defeat hard targets.

There is no Fiscal Year (FY) 2022 funding request.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Small Caliber Ammunition Rapid Prototyping	8.572	-	-
Description: Develop, demonstrate, and qualify small caliber ADVAP cartridges that can defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.			
Accomplishments/Planned Programs Subtotals	8.572	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• FL4: *Small Caliber Ammo for Next Gen Squad Weapons*	17.432	26.483	28.372	-	28.372	-	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC2 / *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost

Remarks

These funding lines support EMD activities for the 7.62mm ADVAP ammunition and rapid prototyping/development of GP and SP ammunition for the NGSW systems. Other Program Funding in Budget Activity 05 (BA 05) PE 0604802A, Project EP5 ADVAP for Small Cal Ammo and BA 05 PE 0604802A Weapons and Munitions - Eng Dev Project FL4 Small Caliber Ammo for Next Gen Squad Weapons

D. Acquisition Strategy

New ammunition development effort for Next Generation Squad Weapons (NGSW) systems, will utilize the MTA authority for rapid prototyping/rapid fielding. 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 2022, prior to production contract award.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EC2 / *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Projectile Development	Option/ CPFF	Northrop Grumman Innovation Systems : Independence, MO	1.046	-		-		-		-		-	Continuing	Continuing	Continuing
Ammo Development Support 1	Option/ CPFF	SAVIT Corporation : Rockaway, New Jersey	-	0.664	Jul 2020	-		-		-		-	Continuing	Continuing	Continuing
Ammo Development Support 2	Option/ CPFF	Concurrent Technologies Corporation (CTC) : Johnstown, Pennsylvania	-	1.014	Aug 2020	-		-		-		-	Continuing	Continuing	Continuing
Projectile Development	Option/ CPFF	OLIN Winchester Corporation : Independence, MO	-	0.763	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
Ammo Cartridge Development 1	Option/ CPFF	Sig Sauer : Newington, NH	0.500	0.500	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
Ammo Cartridge Development 2	Option/ CPFF	General Dynamics : Florham Park, NJ	0.500	0.500	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
Ammo Cartridge Development 3	Option/ CPFF	Textron Systems : Hunt Valley, Maryland	-	0.500	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	2.046	3.941		-		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Picatinny Arsenal : New Jersey	8.067	2.293	Oct 2019	-		-		-		-	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EC2 / *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prototype Manufacturing Support	Option/ FFP	UTRS Inc. : Mount Arlington, New Jersey	-	0.844	Sep 2020	-		-		-		-	0.000	0.844	-
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	2.608	0.694	Oct 2019	-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	10.675	3.831		-		-		-		-	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	3.200	0.500	Oct 2019	-		-		-		-	Continuing	Continuing	Continuing
Testing Support	MIPR	Air Force Research Lab : Wright-Patterson AFB, Ohio	-	0.300	Sep 2020	-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	3.200	0.800		-		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	15.921	8.572		0.000		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC2 / *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*

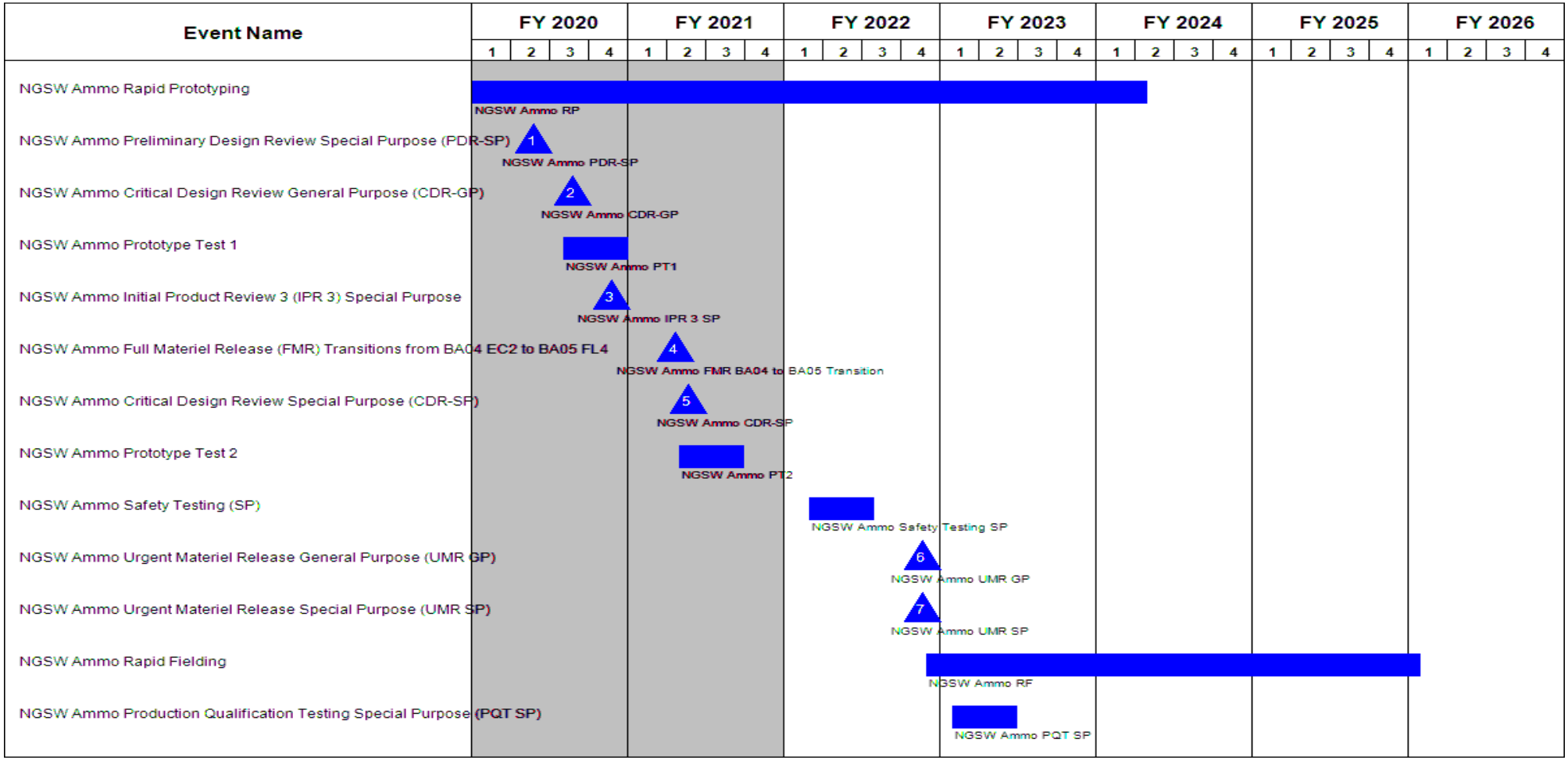

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC2 / *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NGSW Ammo Full Materiel Release (FMR)																		8 NGSW Ammo FMR										

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC2 / *Adv Armor-Piercing (ADVAP) for Small Cal Ammo*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
NGSW Ammo Rapid Prototyping	1	2019	2	2024
NGSW Ammo Initial Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019
NGSW Ammo Preliminary Design Review General Purpose (PDR-GP)	3	2019	3	2019
NGSW Ammo Initial Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)	2	2020	2	2020
NGSW Ammo Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
NGSW Ammo Prototype Test 1	3	2020	4	2020
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
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 Safety Testing (SP)	1	2022	3	2022
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
NGSW Ammo Rapid Fielding	4	2022	1	2026
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)	1	2023	2	2023
NGSW Ammo Full Materiel Release (FMR)	2	2024	2	2024

Note

Note: Next Generation Squad Weapon (NGSW)

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) EC3 / *Ammunition Logistics Prototyping*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EC3: *Ammunition Logistics Prototyping*	-	1.462	1.650	2.141	-	2.141	-	-	-	-	-	-
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. Fiscal Year (FY) 2022 funding will be used to further mature munition health monitoring devices in accordance with the needs of the relevant PMs. However, the preponderance of the funding will be used to directly to support Long Range Precision Fire (LRPF) munition health monitoring requirements throughout its resupply process. Specifically, the funding will be used to address munition health monitoring and packaging/ preservation of munitions within the tactical movement of large caliber ammunition.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Munitions Health and Inventory Monitoring Systems	0.997	1.150	1.065
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. All research and development initiatives will be supporting the Long Range Precision Fires (LRPF) & Solider Lethality (SL) Cross Functional Teams (CFTs) and the multi domain operations modernization objectives that consume, store or transport/distribute munitions and munition components in the maneuver formations.			
FY 2021 Plans: Develop system engineering plan and conduct analysis to identify COTS sensing technologies for application to LRPF and Soldier Lethality munition storage and distribution requirements to ensure munition components reliability through last tactical mile.			
FY 2022 Plans: Develop technologies for monitoring the health of ammunition out of its standard depot pack after issuance from the wholesale ammunition system. Assess utility of providing actionable intelligence through use of the Tactical Ammunition Management System (TAMS).			
FY 2021 to FY 2022 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC3 / *Ammunition Logistics Prototyping*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Slight decrease due to items transitioning to the next level of maturity.			
Title: Munitions Containerization Systems ***Description:*** For each family of munitions containers, optimize prototype container systems for automation compatibility, combat unit load quantity, sustainability/recyclability, Insensitive Munitions/explosives safety, environmental protection, load reconfiguration, unitization, and standardized interfaces. This will improve ammunition distribution efficiency while minimizing environmental and operational impacts. ***FY 2021 Plans:*** Conduct test and evaluation on injection molded cylindrical container for integration with 120mm mortar ammunition. Conduct test and evaluation on injection molded rectangular container for integration with 6.8mm small arms ammunition. ***FY 2022 Plans:*** Pending PM MAS FY21 approval, conduct qualification testing on plastic rectangular injection molded containers/consolidators that are designed to reduce unit logistics & soldier burden and interface with increasingly automated weapon and sustainment systems, for integration with ammunition items under development by PM MAS that support Soldier Lethality CFT modernization objectives. Pending PM CAS FY21 approval, conduct qualification testing on plastic cylindrical injection molded containers/ consolidators that are designed to reduce unit logistics & soldier burden and interface with increasingly automated weapon and sustainment systems, for integration with ammunition items under development by PM CAS that support legacy BCT operations. Develop LRPF munition inner packaging barrier based on environmental assessment completed in FY21. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The funding increase is due to support for Long Range Precision Fire (LRPF) and Soldier Lethality packaging requirements for emerging weapons systems.	0.465	0.500	1.076
Accomplishments/Planned Programs Subtotals	1.462	1.650	2.141

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Fiscal Year (FY) 2022 funding will be used to further mature munition health monitoring devices in accordance with the needs of the relevant PMs. However, the preponderance of the funding will be used to directly to support Long Range Precision Fire (LRPF) munition health monitoring requirements throughout its resupply process. Specifically, the funding will be used to address munition health monitoring and packaging/preservation of munitions within the tactical movement of large caliber ammunition.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC3 / *Ammunition Logistics Prototyping*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Next Generation Temperature Humidity Indicator	C/FFP	AGM : Tuscon, AZ	0.878	0.387	Dec 2019	-		-		-		-	0.000	1.265	-
Contract - Low Cost Thermal Indicator	C/FFP	Innosense : Torrance, CA	2.531	-		-		-		-		-	0.000	2.531	-
Contract - Remote Readiness Asset Prognostic/Diagnostic System (RRAPDS)	C/FFP	Karagozian & Case : Glendale, CA	1.152	-		-		-		-		-	0.000	1.152	-
Contract-Plastic Cylindrical Container	C/FFP	SAVIT : Rockaway, NJ	0.647	-		-		0.250	Jan 2022	-		0.250	0.000	0.897	-
Contract-Plastic Rectangular Container	C/FFP	SAVIT : Rockaway, NJ	-	0.505	May 2020	0.200	Mar 2021	0.250	Jan 2022	-		0.250	0.000	0.955	-
Advanced Munitions Health Monitoring System	C/FFP	TBD : TBD	-	-		-		0.300	Jan 2022	-		0.300	0.000	0.300	-
Tactical Munitions Health Monitoring System	C/FFP	Cybernet : Ann Arbor, MI	-	-		0.650	Mar 2021	0.300	Jan 2022	-		0.300	0.000	0.950	-
		Subtotal	5.208	0.892		0.850		1.100		-		1.100	0.000	8.050	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Picatinny Arsenal : NJ	4.000	0.570	Dec 2019	0.800	Dec 2020	0.841	Nov 2021	-		0.841	0.000	6.211	-
		Subtotal	4.000	0.570		0.800		0.841		-		0.841	0.000	6.211	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC3 / *Ammunition Logistics Prototyping*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Yuma Proving Ground	MIPR	Yuma : AZ	0.086	-		-		-		-		-	0.000	0.086	-
Test and Evaluation	MIPR	TBD : TBD	0.150	-		-		0.200	Mar 2022	-		0.200	0.000	0.350	-
		Subtotal	0.236	-		-		0.200		-		0.200	0.000	0.436	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	9.444	1.462		1.650		2.141		-		2.141	0.000	14.697	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC3 / *Ammunition Logistics Prototyping*

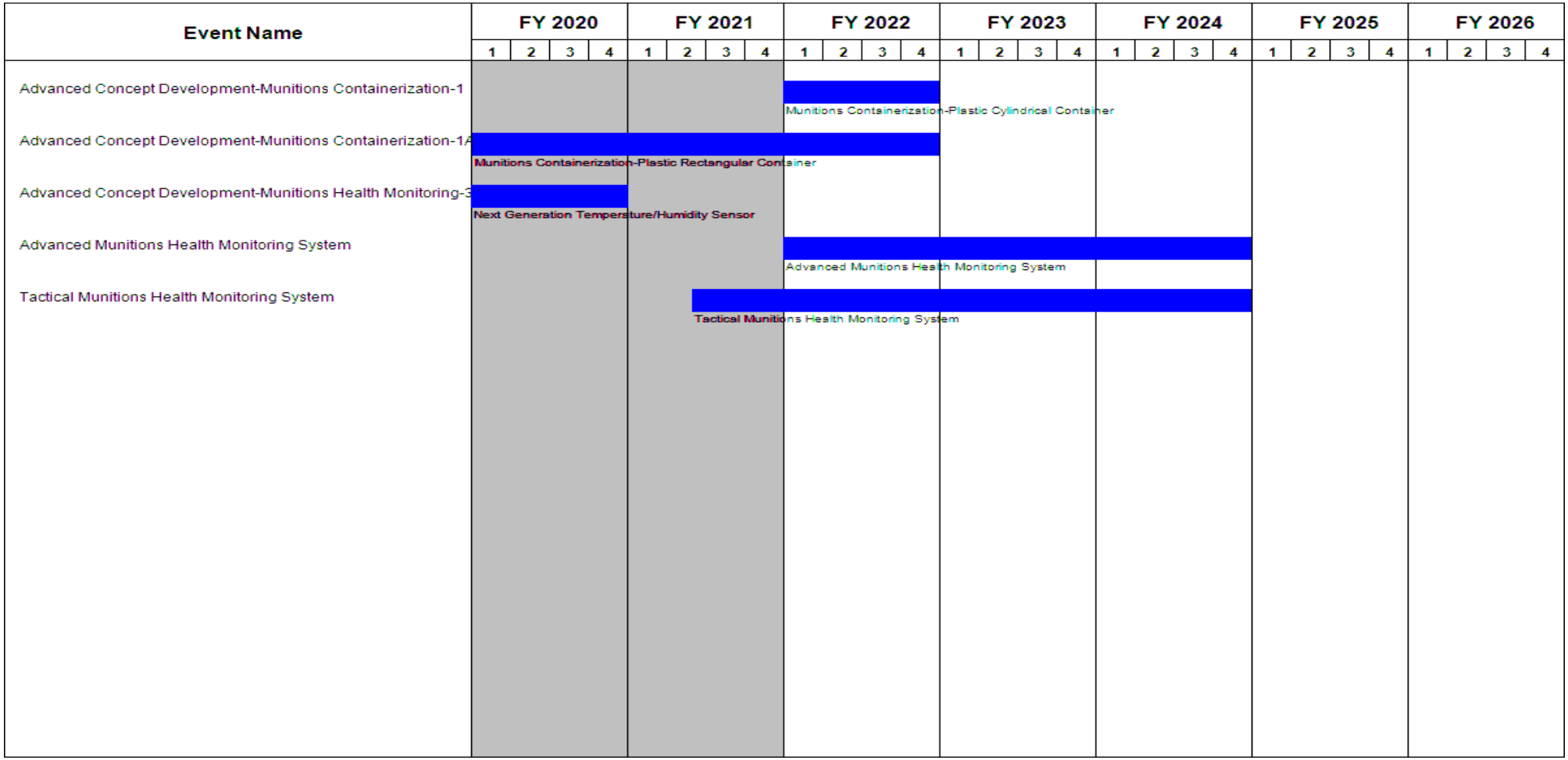

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** EC3 / *Ammunition Logistics Prototyping*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Advanced Concept Development-Munitions Containerization-1	1	2022	4	2022
Advanced Concept Development-Munitions Containerization-1A	1	2020	4	2022
Advanced Concept Development-Munitions Health Monitoring-3	3	2017	4	2020
Advanced Munitions Health Monitoring System	1	2022	4	2024
Tactical Munitions Health Monitoring System	2	2021	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) FA5 / *Assured Precision Weapons and Munitions*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FA5: *Assured Precision Weapons and Munitions*	-	29.981	28.788	43.005	-	43.005	-	-	-	-	-	-
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 (SoS) environment. The APWM Project reinforces the National Defense Strategy's major lines of effort through technology development and prototyping, which increases lethality and ensures future combat overmatch success of the Joint Force against peer/near-peer adversaries. This project also aims to improve 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 Global Positioning System (GPS) coordinated efforts. The APWM Project directly supports top Army Modernization Priorities via the Assured-PNT (A-PNT) and Long Range Precision Fires (LRPF) Cross Functional Team (CFT) imperatives 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, Army's PNT related programs, and A-PNT/Space CFT programs in support of LRPF and Counter Anti-Access/Area Denial (A2/AD) missions. Funding will also enable component and subsystem architecture input essential for Precision Weapons and Munitions (PW&M) operating in a Navigation Warfare (NavWar) SoS environment, Army M-Code GPS technology integration and evaluation, planning and evaluating next generation M-Code GPS to validate capability for future Joint precision munitions, and maturation of alternative PNT and NavWar related technologies and solutions to enable informed A-PNT related PoR milestone and Army cross-functional modernization decisions.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: APWM Integrated Product Support - Joint Lethality PNT SME Working Integrated Product Team (WIPT) & Program Management	3.397	3.526	3.566
Description: Provide APWM technical subject matter expertise and support to the Joint oversight board for APWM. Provide overall APWM Project Program Management support. ***FY 2021 Plans:*** The subject matter experts will continue coordinating with and supporting the development and technology delivery activities of the A-PNT/Space CFT, Air Force?s MGUE program and the Army?s PNT related programs 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			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FA5 / *Assured Precision Weapons and Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
management of the evolving Joint Common GPS Specification and Interface Control Document for PGMs. Specific support focus includes requirements for MGUE Increment 2 and alternative PNT technology maturity. ***FY 2022 Plans:*** The Subject Matter Experts (SMEs) will continue coordinating with and supporting the development and technology delivery activities of the Joint Weapons and Munitions community, to include PNT modernization and NavWar related programs 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 SoS multi-domain environment, and configuration management of the evolving Precision Guided Munition (PGM) Technical Requirements Document (TRD). Specific support focus includes requirements for Military GPS User Equipment (MGUE) Increment 2 and alternative PNT technology maturity. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Level of effort required in FY 2022 is slightly higher than FY 2021 due to A-PNT/Space CFT and Air Force?s MGUE program efforts, maturing NavWar initiatives, and increasing complexity of multi-domain operations (MDOs) impacting collaborative efforts for the Joint Lethality community.			
Title: Assured PNT related Integration Risk Mitigation - A-PNT for Family of Scatterable Mines (FASCAM) Replacement ***Description:*** Evaluate, mature and test A-PNT system/subsystem components for terrain shaping enabling technologies.	1.904	-	-
Title: Assured PNT related Integration Risk Mitigation - NA2 for Weapons and Munitions Phase 2 ***Description:*** Perform Network Assisted APNT (NA2) SoS capability integration and pre system qualification integration risk reduction activities. Improve initial prototype NA2 capability and initiate improved prototype for subsequent transition to corresponding PoRs. Inform future NavWar related weapons and munitions platform dependencies. Integrate and synchronize AltNav capability delivery within NA2 to meet A-PNT/Space CFT AltNav Directed Requirement which summarizes the urgent need for AltNav initial operational capability (IOC) in two Brigade Combat Teams (BCTs) NLT 1QFY24. ***FY 2021 Plans:*** Perform Assured PNT system-of-systems integration risk reduction activities. Refine NA2 sub-system prototype software. Conduct full system of systems integration test event for NA2 to mitigate risk of transitioning NA2 capability to the field via multiple Programs of Record to meet A-PNT/Space CFT AltNav Directed Requirement for Initial Operational Capability in FY 2024. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	5.494	3.700	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FA5 / *Assured Precision Weapons and Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
NA2 for Weapons and Munitions Phase 2 executes a SoS demonstration in FY 2021 with first generation PW&M APNT Technology. Prototyping and capability transition to Fires SoS APNT related AS and NavWar for spiral improvement to include next generation APNT technologies and NavWar.			
Title: Assured PNT related Integration Risk Mitigation - NA2 for Guided Rocket/Missile Launcher Systems ***Description:*** Perform software development and prototyping activities to demonstrate NA2 capability for Rocket/Missile artillery launcher systems. Integrate and demonstrate upgraded artillery launcher system into the NA2 SoS networked capability to reduce subsequent PoR fielding risks. Integrate and synchronize AltNav capability delivery within NA2 to meet A-PNT/Space CFT AltNav Directed Requirements which summarizes the urgent need for AltNav IOC in two BCTs NLT 1QFY24. ***FY 2021 Plans:*** Perform Assured PNT Rocket/Missile system-of-systems integration risk reduction activities. Refine Rocket/Missile artillery launcher NA2 prototype software. Conduct full system-of-systems integration developmental test event utilizing Rocket/Missile artillery launchers for NA2 to mitigate risk of transitioning NA2 capability to the field to meet A-PNT/Space CFT AltNav Directed Requirement for Initial Operational Capability in FY 2024. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** NA2 for Guided Rocket/Missile Launcher Systems executes a SoS demonstration in FY 2021 with first generation PW&M APNT Technology. Prototyping and capability transition to Fires SoS APNT related AS and NavWar for spiral improvement to include next generation APNT technologies and NavWar.	2.956	2.000	-
Title: Fires System-of-Systems APNT related AS and Navigation Warfare (NavWar) ***Description:*** Prototype PNT enabling technologies that are critical for executing Fires SoS NavWar missions to include munition-based offensive, defensive, and associated Command and Control (C2) functions. Prototyping efforts will focus on enabling combat lethality overmatch in PNT challenged environments for cannon and rocket/missile core missions. Prototype long range stand-off NavWar capability to penetrate contested A2/AD environments via use of long-range artillery, Fires SoS architectures enabling advanced NavWar attack, sense, and optimization, and advanced anti-jam/anti-spoof techniques for munitions. ***FY 2021 Plans:*** Prototype PNT enabling technologies that are critical to APNT and AS operational capabilities within the fires system-of-systems domain. Prototyping efforts will focus on enabling and or maintaining combat lethality overmatch in PNT challenged environments for cannon and rocket/missile applications. Design and develop a gun-hardened NavWar system prototype that can be demonstrated in a Live Fire Test from a 155mm artillery cargo round to prove its capability in FY 2022. Technical reports informing emerging gun-launched NavWar CONOPs and capability requirements. ***FY 2022 Plans:***	-	3.786	5.386

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Continue maturing initial prototypes for gun-hardened NavWar systems. Conduct integration activities of a gun-hardened NavWar system prototype and execute a Live Fire Test demonstration from a 155mm artillery cargo round. A technical report will document results of the gun-launched NavWar prototype. Identify and define the future Fires SoS MDO interdependencies to enable a suite of NAVWAR operational capabilities and develop near, mid, and long term MDO Fires and NAVWAR strategies to meet Army modernization imperatives. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 continues maturing initial Fires SoS APNT related AS and NavWar prototypes leading up to an eventual live fire demonstration of capabilities. Level of effort increases from FY 2021 to FY 2022 due to continuation of prototyping efforts, added integration and demonstration efforts, and continued virtual prototyping of MDO solutions to meet Army modernization imperatives.			
Title: Next Generation PNT Technologies Phase 1 ***Description:*** Continue prototyping APNT technologies to provide the next generation of APNT capability to weapons and munitions in a highly complex and fast paced battlefield. Will leverage prior Army Science &Technology (S&T), previous integrated demonstration events, information on threat advancement, and lessons learned to rapidly develop, integrate, prototype, and transition critical APNT technologies to weapons and munitions directly supporting LRPF and Air & Missile Defense (AMD) initiatives. ***FY 2022 Plans:*** Continue to mature and improve proven APNT technology for spiral development and integration into weapons and munitions to maintain combat lethality overmatch in highly contested PNT environments. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 continues to spirally mature and integrate proven APNT technology utilizing prior prototyping and demonstration initiatives to outpace the threat and enable LRPF in a highly complex MDO environment requiring increased resources.	-	-	1.500
Title: Assured PNT related Weapons & Munitions Prototyping - AltNav Technologies (AltNav) Phase 2 ***Description:*** Conduct rapid development and prototyping of AltNav receivers for PGMs and assess operational feedback (receivers, enterprise service, and integration) of solutions to maximize utility of AltNav for LRPF meeting the intent of paragraph 6 of the A-PNT/Space CFT AltNav Directed Requirement. Demonstrate and conduct performance assessments of potential hardware and software solutions to support Artillery integration efforts as well as inform future Space-based PNT related alternatives for the Land Combat domain. ***FY 2021 Plans:***	4.962	3.175	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Perform AltNav prototype integration activities to facilitate and conduct guide-to-hit PGM experiments. Generate AltNav performance evaluation and technology transition reports that meet the intent of the A-PNT/Space CFT AltNav Directed Requirement. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** AltNav technology, lessons learned, and investment strategies for spiral improvement transition to Next Generation PNT technologies Phase 1.			
Title: Assured PNT related Weapons & Munitions Prototyping - Location Azimuth Determinations System (LADS) ***Description:*** Development and integration of prototype LADS to demonstrate an assured weapon survey capability within the M777A2 and M119A3 Howitzer Platforms.	1.223	-	-
Title: Rocket/Missile Precision Guided Munition M-Code Prototyping ***Description:*** Directly supports M-Code public law by rapidly prototyping M-Code receivers for direct transfer to rocket/missile systems. ***FY 2022 Plans:*** Prototyping of Army NAVSTORM-M capability for Deep Fire Artillery PGMs. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 increase directly supporting last year of M-Code receiver prototype development that will directly transition to rocket/missile applications.	-	-	6.000
Title: Munition Deployed NavWar Countermeasures ***Description:*** Prototype, integrate, and experiment with initial increment of Munition Deployed NavWar Countermeasures (MDNC) and weapons and munitions System of Systems dependencies directly supporting APNT/Space CFT NavWar initiatives and LRPF initiative of penetrating, disrupting, and disintegrating Anti Access/Area Denial (A2/AD) environments to enable employment of precision weapons and munitions. ***FY 2022 Plans:*** Evaluate and experiment with MDN-C solutions and weapons and munitions system of systems dependencies to penetrate and disrupt enemy A2 / AD. Inform extended range cargo carrier and mid to long-term NavWar initiatives to deliver standoff countermeasure effects enabling freedom of operations and employment of precision weapons and munitions in A2/AD environments. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	-	-	6.014

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Develops physical and virtual prototypes of continued Fires SoS APNT related AS and NavWar virtual prototyping efforts to experiment with standoff NavWar countermeasure effects requiring increased funding and resources. Effort is critical to inform full NavWar strategy for LRPF and AMD to operate in MDO.			
Title: Assured PNT related Weapons & Munitions Prototyping - PGM Software-Defined Receiver (SDRx) ***Description:*** Develop a prototype ?All In One? (Global Positioning System (GPS), Global Navigation Satellite System (GNSS), Alternative Navigation (AltNav), Signals of Opportunity (SoO)) software defined radio frequency Assured Position, Navigation and Timing (A-PNT) receiver for a large portion of the Precision Guided Munition (PGM) portfolio. ***FY 2022 Plans:*** Develop diverse RF Basic Navigation functions required for a prototype PGM SDRx. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Leveraging prior investments by the Aviation community, develop software-based basic navigation functions needed for a smaller prototype SDRx targeted for the PGM Lethality domain.	-	-	6.636
Title: Army M-Code Technology Integration and Evaluation ***Description:*** Provide technical assessment, coordination, and engineering support related to the development, prototyping, integration, and evaluation of Air Force?s MGUE technology deliverables across all Army Weapons and Munitions, including participation in design reviews, testing, evaluation, and formal feedback on technology, component-level, card-level, sub-system-level, and systems-level requirements and performance. Reduce risk, support, and inform M-Code GPS related Army cross-functional modernization decisions for weapons and munitions operating in a peer/near threat SoS environment as well as identifying complementary PNT and related solutions when M-Code GPS is not solely sufficient to enable Combat Overmatch. ***FY 2021 Plans:*** Lead an Army M-Code GPS Weapons and Munitions IPT and influence the Air Force?s MGUE technology investments via established requirements and performance based needs for Army Weapons and Munitions. Lead a centralized Army evaluation, prototyping, and experimentation mechanism to assess the effectiveness of M-Code GPS focused weapon and munition platform capabilities operating in a peer/near PNT threat system-of-systems environment. Lead a multi-organizational IPT to execute study, analysis, and integration imperatives for the Army M-Code Task Force. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** See New Title for statement: Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation.	9.022	11.101	-
Title: Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation	-	-	12.403

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: Provide technical assessment, coordination, and engineering support related to the development, prototyping, integration, and evaluation of Air Force?s MGUE technology deliverables across all Army Weapons and Munitions, including participation in design reviews, testing, evaluation, and formal feedback on technology, component-level, card-level, sub-system-level, and systems-level requirements and performance. Reduce risk, support, and inform M-Code GPS related Army cross-functional modernization decisions for weapons and munitions operating in a peer/near threat SoS environment as well as identifying complementary PNT and NavWar related solutions when M-Code GPS is not solely sufficient to enable Combat Overmatch. ***FY 2022 Plans:*** Continue to lead the Army M-Code GPS Weapons and Munitions IPT and influence the Air Force?s MGUE technology investments via established requirements and performance based needs for Army Weapons and Munitions. Lead a centralized Army evaluation, prototyping, and experimentation mechanism to assess the effectiveness of M-Code GPS focused weapon and munition platform capabilities as well as emerging NavWar related capabilities operating in a peer/near PNT threat SoS environment. Continue to lead the multi-organizational IPT to execute study, analysis, integration, and migration imperatives for the Army M-Code Task Force. Support high priority Army programs transitioning to M-Code to meet Army modernization objectives. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** This is not a new work effort, but rather a name change to better reflect a logical extension of technology scope for this ongoing work effort. The evolution of the peer/near-peer threat environment has necessitated extending the focus of this Technology Integration and Evaluation work effort beyond solely M-Code GPS to also encompass the greater APNT domain as well as addressing the impacts of NavWar technologies on Army weapons and munitions. Level of effort required in FY 2022 is slightly higher than FY 2021 due to further maturation of next generation M-Code technology, and initiation of M-Code integration migration for high priority Army platforms to meet force package initiatives and timelines as well as IPT support for emerging NavWar related capabilities.			
Title: MGUE Increment 2 (Inc2) with Precision Guidance Kit - Anti Jam (LR PGK)	1.023	1.500	-
Description: Influence next generation MGUE development to ensure precision guided munition needs and requirements are met with the Air Force's next generation MGUE. Integrate and test next generation MGUE into the Long Range Precision Guidance Kit (LR-PGK) as the DoD-selected representative Joint precision munition to verify and validate needs and requirements are met by next generation MGUE. ***FY 2021 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Perform modeling and simulations on GPS threat scenarios on MGUE designs to assess performance for PGM applications. Perform risk reduction analysis and activities of MGUE vendor designs. Draft Inc2 Next Generation Application Specific Integrated Circuit (ASIC) (NGA) Technology Maturity Assessment (TMA) & Integration Risk Analysis (IRA) Report for PGMs. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** See New Title for statement: MGUE Inc2 for JROC-directed PGM Lead Platform.			
Title: MGUE Inc2 for JROC-directed PGM Lead Platform ***Description:*** Influence next generation MGUE development to ensure precision guided munition needs and requirements are met with the Air Force's next generation MGUE. Evaluate the next generation MGUE using the Long Range Precision Guidance Kit (LR-PGK) as the DoD-selected representative Joint precision munition to verify and validate PGM needs and requirements are met by next generation MGUE. ***FY 2022 Plans:*** Perform M&S on GPS threat scenarios on MGUE designs to assess performance for PGM applications. Perform risk reduction analysis and activities of MGUE vendor designs. Draft Inc2 Next Generation Application Specific Integrated Circuit (ASIC) NGA TMA & IRA Report for PGMs. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** This is not a new work effort, but rather a name change to better reflect the underlying purpose for this ongoing work effort. To ensure precision guided munition needs and requirements are met with the Air Force's next generation MGUE development, DoD selected a representative Joint precision munition lead platform to verify and validate these needs and requirements are met by this next generation MGUE. The DoD selected precision munition lead platform was LR-PGK. Funding and level of effort required in FY 2021 & FY 2022 are the same.	-	-	1.500
Accomplishments/Planned Programs Subtotals	29.981	28.788	43.005

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisition Strategy: The Assured Precision Weapons and Munitions Project will utilize a combination of Other Transaction Authority (OTA) contract mechanisms such as the Defense Ordinance Technology Consortium (DOTC) OTA and In-House government development and engineering capabilities to obtain prototypes and

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demonstrate/evaluate the maturity and integration risk of the M-Code GPS on Precision Munitions and Weapons, as well as other alternative PNT and NavWar related capabilities.

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Assured PNT related Weapons Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	6.850	4.324	Dec 2019	4.310	Dec 2020	-		-		-	0.000	15.484	-
Assured PNT related Weapons Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD, Various : Various	4.000	1.271	Dec 2019	1.000	Dec 2020	-		-		-	0.000	6.271	-
Assured PNT related Munitions Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	5.000	4.571	Dec 2019	2.786	Dec 2020	-		-		-	0.000	12.357	-
Assured PNT related Munitions Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	4.000	4.611	Dec 2019	3.175	Dec 2020	5.615	Dec 2021	-		5.615	0.000	17.401	-
Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation	MIPR	Various : Various	-	6.521	Dec 2019	6.101	Dec 2020	7.200	Dec 2021	-		7.200	Continuing	Continuing	Continuing
Weapon & Munitions Prototyping & Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	-	-		-		16.669	Dec 2021	-		16.669	Continuing	Continuing	Continuing
		Subtotal	19.850	21.298		17.372		29.484		-		29.484	Continuing	Continuing	N/A

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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total 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	2.182	1.140	Dec 2019	1.275	Dec 2020	1.281	Dec 2021	-		1.281	Continuing	Continuing	Continuing
Assured Precision Weapons and Munitions IPT Support	MIPR	Various : Various	3.947	2.176	Dec 2019	2.341	Dec 2020	2.437	Dec 2021	-		2.437	Continuing	Continuing	Continuing
Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation Support. (Multiple PEO Sup	MIPR	Various : Various	-	-		1.500	Dec 2020	5.203	Dec 2021	-		5.203	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Combat Capability Development Command Armament Center (CCDC AC) : Picatinny Arsenal, NJ	1.492	1.204	Dec 2019	1.100	Dec 2020	2.500	Dec 2021	-		2.500	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Communication Electronics Research,Development and Engineering Center (C5ISR) : Aberdeen Proving Ground, MD	0.800	0.671	Dec 2019	0.200	Dec 2020	0.400	Dec 2021	-		0.400	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Aviation and Missiles Center (AvMC) : Redstone Arsenal, AL	-	-		-		0.200	Dec 2021	-		0.200	0.000	0.200	-
Army M-Code Technology Integration and Evaluation Support	MIPR	Various : Various	-	2.421	Dec 2019	3.500	Dec 2020	-		-		-	0.000	5.921	-

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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MGUE Inc2 for JROC-directed PGM Lead Platform Support	MIPR	Combat Capability Development Command Armament Center (CCDC AC) : Picatinny Arsenal, NJ	-	1.071	Dec 2019	1.500	Dec 2020	1.500	Dec 2021	-		1.500	Continuing	Continuing	Continuing
		Subtotal	8.421	8.683		11.416		13.521		-		13.521	Continuing	Continuing	N/A

Remarks

Support consists of labor, travel and other non-labor costs in Fiscal Year (FY) 2022.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	28.271	29.981		28.788		43.005		-		43.005	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FA5 / *Assured Precision Weapons and Munitions*

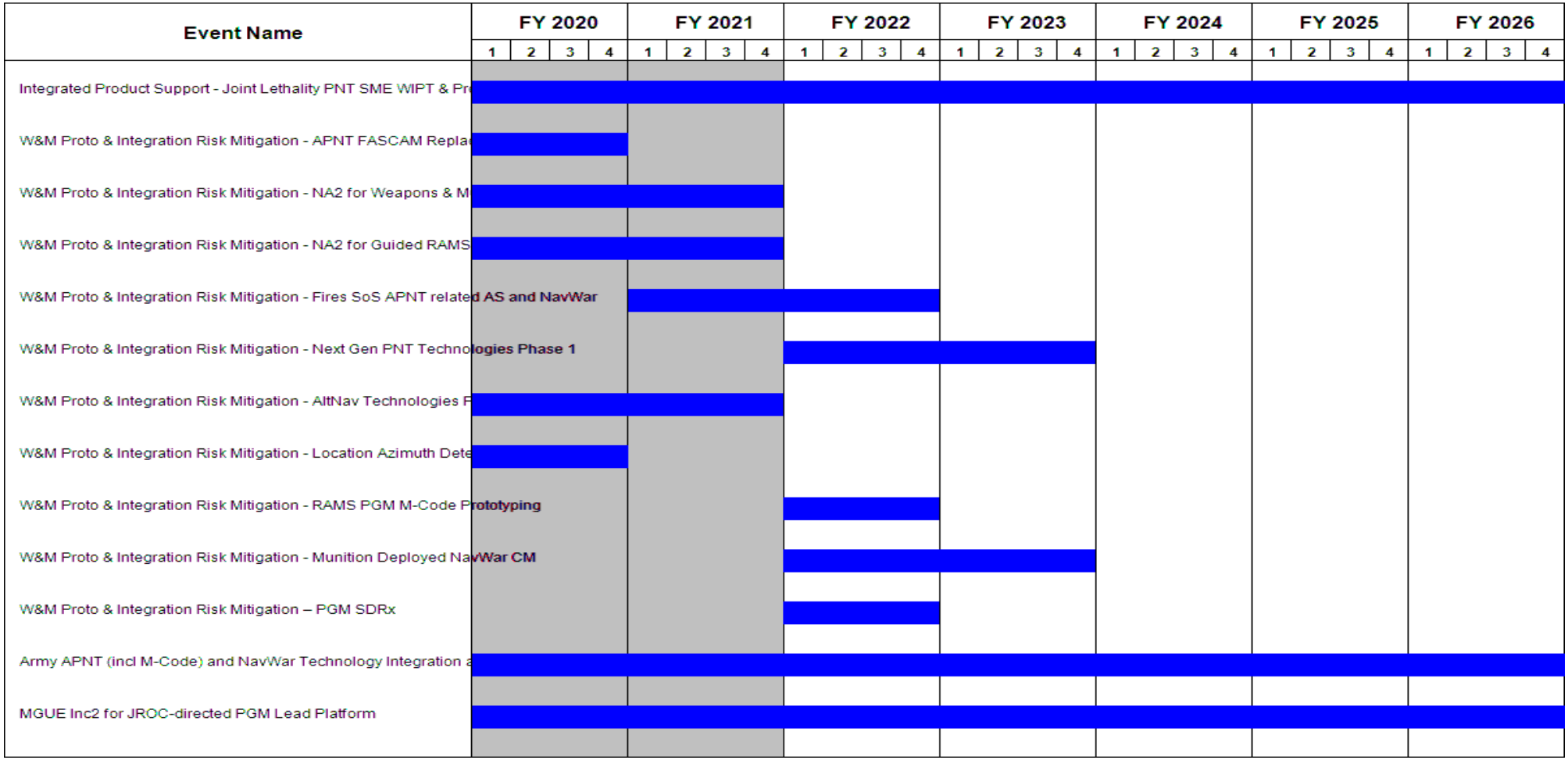

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FA5 / *Assured Precision Weapons and Munitions*

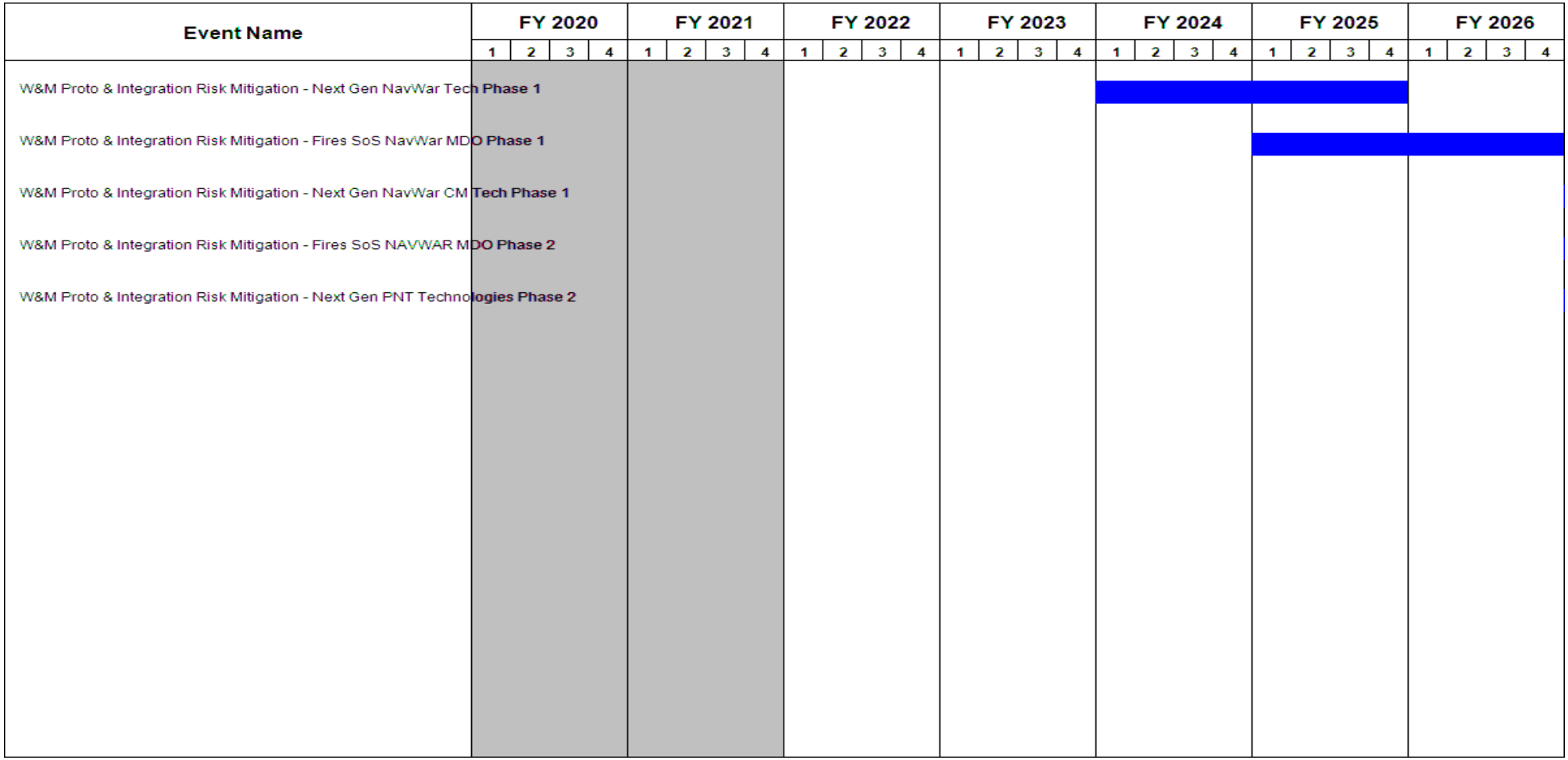

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FA5 / *Assured Precision Weapons and Munitions*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Integrated Product Support - Joint Lethality PNT SME WIPT & Program Management	1	2017	4	2028
W&M Proto & Integration Risk Mitigation - APNT FASCAM Replacement	1	2019	4	2020
W&M Proto & Integration Risk Mitigation - NA2 for Weapons & Munitions Phase 2	1	2020	4	2021
W&M Proto & Integration Risk Mitigation - NA2 for Guided RAMS	1	2020	4	2021
W&M Proto & Integration Risk Mitigation - Fires SoS APNT related AS and NavWar	1	2021	4	2022
W&M Proto & Integration Risk Mitigation - Next Gen PNT Technologies Phase 1	1	2022	4	2023
W&M Proto & Integration Risk Mitigation - AltNav Technologies Phase 2	1	2020	4	2021
W&M Proto & Integration Risk Mitigation - Location Azimuth Determinations System	1	2020	4	2020
W&M Proto & Integration Risk Mitigation - RAMS PGM M-Code Prototyping	1	2022	4	2022
W&M Proto & Integration Risk Mitigation - Munition Deployed NavWar CM	1	2022	4	2023
W&M Proto & Integration Risk Mitigation ? PGM SDRx	1	2022	4	2022
Army APNT (incl M-Code) and NavWar Technology Integration and Evaluation	1	2020	4	2028
MGUE Inc2 for JROC-directed PGM Lead Platform	1	2020	2	2027
W&M Proto & Integration Risk Mitigation - Next Gen NavWar Tech Phase 1	1	2024	4	2025
W&M Proto & Integration Risk Mitigation - Fires SoS NavWar MDO Phase 1	1	2025	4	2026
W&M Proto & Integration Risk Mitigation - Next Gen NavWar CM Tech Phase 1	1	2027	4	2028
W&M Proto & Integration Risk Mitigation - Fires SoS NAVWAR MDO Phase 2	1	2027	4	2028
W&M Proto & Integration Risk Mitigation - Next Gen PNT Technologies Phase 2	1	2027	4	2028

Note

Notes:
Positioning, Navigation and Timing (PNT)
Subject Matter Expert (SME)
Working Integrated Product Team (WIPT)

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FA5 / *Assured Precision Weapons and Munitions*

Network Assisted (NA)
Assured Positioning, Navigation and Timing (APNT)

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) FG1 / *Cannon-Delivered Area Effects Munitions (C-DAEM)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FG1: *Cannon-Delivered Area Effects Munitions (C-DAEM)*	-	20.564	38.466	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year (FY) 2022, Project FG1, Cannon-Delivered Area Effects Munitions, will transition to Budget Activity 5, Program Element (PE) 0604802A, Weapons and Munitions Engineering Development, Project FJ4, Cannon-Delivered Area Effects Munitions. There is no FY 2022 request for Project FG1.

A. Mission Description and Budget Item Justification

The Cannon-Delivered Area Effects Munitions (C-DAEM) Project will provide United States (U.S). ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018 to inform Army acquisition and investment decisions regarding replacement of the current stockpile of 155 millimeter (mm) Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense (DoD) policy compliant munitions and address anti-armor and extended range capability requirements. The Army validated two materiel solutions for C-DAEM to be pursued in parallel. C-DAEM Armor (Increment 1) will destroy moved and moving infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM DPICM Replacement (Increment 2) will destroy personnel to light-skinned vehicles. There is no FY 2022 budget request.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: C-DAEM Armor	20.564	38.466	-
Description: C-DAEM Armor will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. ***FY 2021 Plans:*** FY 2021 funding supports the completion of the C-DAEM Armor competitive demonstration phase which will identify the most promising candidate(s) to support the Army's modernization priorities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease in funding from FY 2021 to FY 2022 due to transition of Cannon-Delivered Area Effects Munitions (C-DAEM) to Budget Activity (BA) 5 Program Element (PE) 0604802A, Project FJ4, C-DAEM.			
Accomplishments/Planned Programs Subtotals	20.564	38.466	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FG1 / *Cannon-Delivered Area Effects Munitions (C-DAEM)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• FJ4: *Cannon-Delivered Area Effects Munitions (C-DAEM)*	-	26.593	89.138	-	89.138	-	-	-	-	-	-
• E68603: *PROJ, ARTY, 155MM C-DAEM INCREMENT 1*	-	-	-	-	-	-	-	-	-		

Remarks

In FY 2021, Project FG1 supports C-DAEM Armor efforts. C-DAEM Armor will transition to Budget Activity 05 PE 0604802A Weapons and Munitions - Eng Dev Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM), in FY 2022. In FY 2023, C-DAEM Armor will transition to production. A Procurement of Ammunition, Army (PAA) funding line, Standard Study Number (SSN) E68603, PROJ, ARTY, 155MM C-DAEM INCREMENT 1, is established for this effort.

In FY 2021, the C-DAEM DPICM Replacement effort will transition to BA 05 PE 0604802A Weapons and Munitions - Eng Dev Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM). A PAA funding line for C-DAEM DPICM Replacement, SSN E68604, PROJ, ARTY, 155MM C-DAEM INCREMENT 2, will be established in FY 2024 for this effort.

D. Acquisition Strategy

C-DAEM will employ an evolutionary acquisition approach to efficiently transition the unique ammunition products as they become available. The AoA completed on 31 January 2018 qualified a dramatic enhancement of operational Fires effectiveness, efficiency, and maneuver support when cannon artillery was equipped with a dedicated extended range, anti-armor projectile. The U.S. Government is currently reducing risk by executing prototype testing and evaluation efforts in parallel to decompose the AoA results into selection criteria. C-DAEM will use the selection criteria to sponsor a competitive demonstration for C-DAEM Armor to streamline the acquisition process by leveraging Section 815 of the FY 2016 National Defense Authorization Act (NDAA). C-DAEM will use the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) to further support the completion of the C-DAEM Armor competitive demonstration phase, in FY 2021, which will inform the Army's cluster munition replacement strategy. Upon completion of the competitive demonstration phase, C-DAEM will proceed to qualification testing of the most promising candidate(s) in accordance with the decisions granted at the Army Requirements Oversight Council (AROC), in April 2018.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) FG1 / *Cannon-Delivered Area Effects Munitions (C-DAEM)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	1.360	1.730	Nov 2019	0.360	Oct 2020	-		-		-	Continuing	Continuing	Continuing
		Subtotal	1.360	1.730		0.360		-		-		-	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Armor TMRR Phase	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	3.753	16.622	Apr 2020	31.594	Nov 2020	-		-		-	Continuing	Continuing	Continuing
		Subtotal	3.753	16.622		31.594		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Armor Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	1.310	1.412	Nov 2019	5.229	Nov 2020	-		-		-	Continuing	Continuing	Continuing
Armor Engineering Support	MIPR	Combat Capabilities Development Command Data Analysis Center (CCDC DAC) : Aberdeen, MD	-	0.106	Apr 2020	-		-		-		-	0.000	0.106	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) FG1 / *Cannon-Delivered Area Effects Munitions (C-DAEM)*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Armor Fire Control Software Integration	MIPR	U.S. Army Communications-Electronics Command (CECOM) : Aberdeen, MD	-	-		0.683	Jan 2021	-		-		-	0.000	0.683	-
DPICM Replacement Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	0.250	-		-		-		-		-	0.000	0.250	-
		Subtotal	1.560	1.518		5.912		-		-		-	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Armor Test Targets	MIPR	Army Test and Evaluation Command (ATEC) - Yuma Proving Grounds : Yuma, AZ	-	0.694	Aug 2020	-		-		-		-	0.000	0.694	-
Armor Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		0.600	Apr 2021	-		-		-	Continuing	Continuing	Continuing
		Subtotal	-	0.694		0.600		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.673	20.564		38.466		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / *Tank and Medium Caliber Ammunition*	Project (Number/Name) FG1 / *Cannon-Delivered Area Effects Munitions (C-DAEM)*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FG1 / *Cannon-Delivered Area Effects Munitions (C-DAEM)*

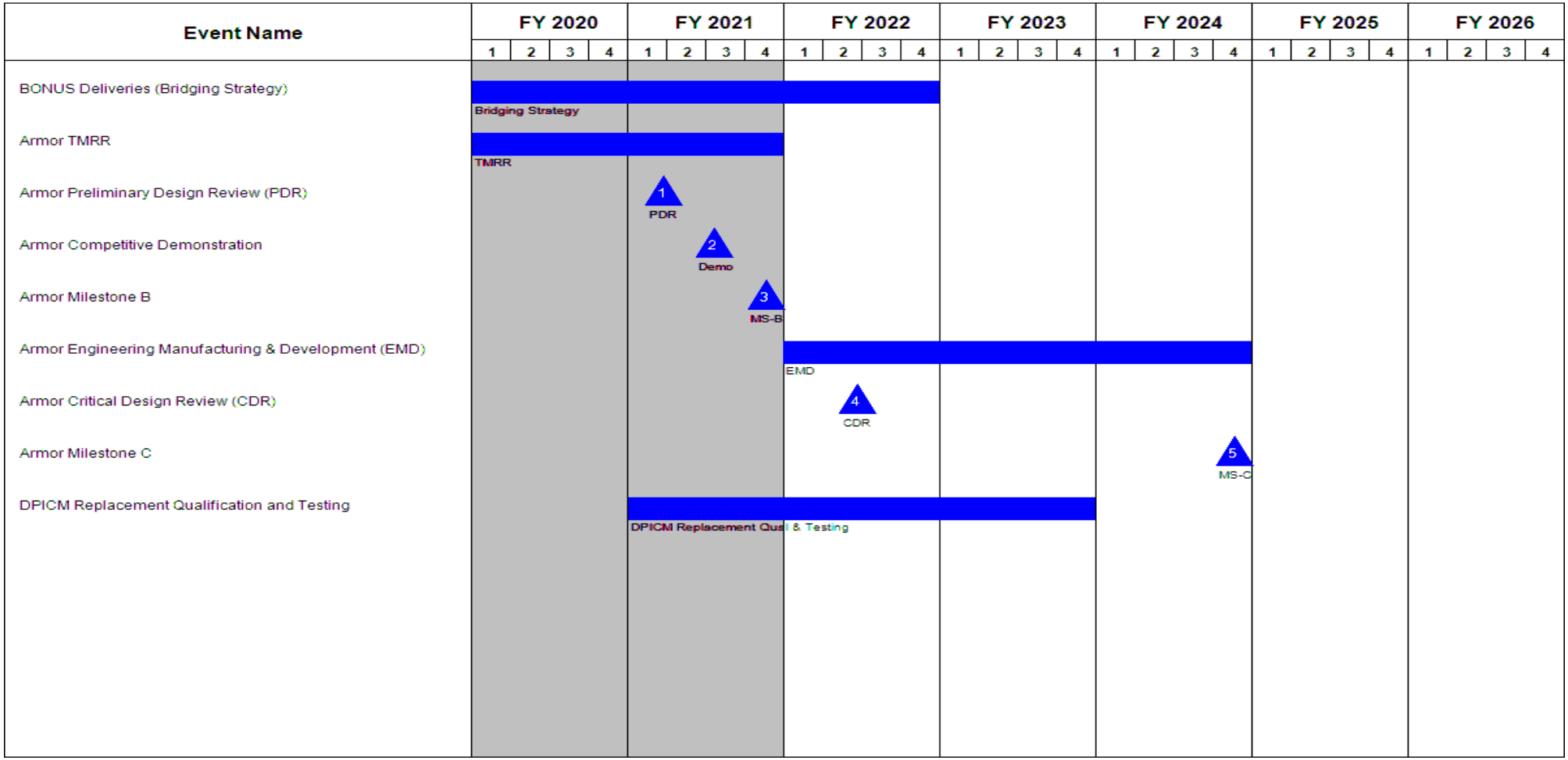

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0603639A / *Tank and Medium Caliber Ammunition*	**Project (Number/Name)** FG1 / *Cannon-Delivered Area Effects Munitions (C-DAEM)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
C-DAEM AoA, CDD, MS-A Efforts	1	2018	4	2019
Armor Milestone A	1	2019	1	2019
BONUS Deliveries (Bridging Strategy)	1	2020	4	2022
Armor TMRR	1	2019	4	2021
Armor Preliminary Design Review (PDR)	1	2021	1	2021
Armor Competitive Demonstration	3	2021	3	2021
Armor Milestone B	4	2021	4	2021
Armor Engineering Manufacturing & Development (EMD)	1	2022	4	2024
Armor Critical Design Review (CDR)	2	2022	2	2022
Armor Milestone C	4	2024	4	2024
DPICM Replacement Qualification and Testing	1	2021	4	2023

Note

Cannon-Delivered Area Effects Munitions (C-DAEM) Armor will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM Dual Purposed Improved Conventional Munitions (DPICM) Replacement will destroy personnel to light-skinned vehicles. C-DAEM Armor and DPICM Replacement are being developed simultaneously.