Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Office of the Secretary Of Defense	Date: April 2022
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	24.098	20.529	18.961	0.000	18.961	19.493	19.883	20.302	20.708	Continuing	Continuing
076: *Enhanced Munitions*	-	17.676	20.529	18.961	0.000	18.961	19.493	19.883	20.302	20.708	Continuing	Continuing
204: *Enabling Fuze Technology*	-	6.422	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

New Start (Y/N): No

This Program Element (PE 0602000D8Z) aligns with and compliments PE 0603000D8Z, Joint Munitions Advanced Technology. Prior to FY 2022, two project codes within each PE formed the 6.2 applied research and 6.3 technology demonstration components of the Joint Enhanced Munitions Technology Program (JEMTP) and the Joint Fuze Technology Program (JFTP). The JEMTP funds applied research efforts from PE 0602000D8Z Project code (P) 076 Enhanced Munitions and technology demonstration efforts from PE 0603000D8Z P077. The JFTP funds applied research efforts from PE 0602000D8Z P204 Enabling Fuze Technology and technology demonstration efforts from PE 0603000D8Z P301. In FY 2022, the JFTP and JEMTP merged and the program scope expanded to exploit technology developments and accelerate their application to enable next generation kinetic weapons capabilities in the areas of energetic materials, propulsion, warhead effects, fuzing, power sources, guidance, navigation and control, communications and munitions airframe applied technologies.

With the JFTP and JEMTP merge in FY 2022, the P204 Enabling Fuze Technology line and budget have combined in P076 Enhanced Munitions.

A. Mission Description and Budget Item Justification

This program supports the Department's initiatives to Deter Aggression, Defend the Homeland, and Build Sustainable and Long-Term Advantage.

This program conducts cross-cutting, foundational research improving the lethality, range, reliability, safety, survivability, and effectiveness of kinetic weapon systems to rapidly advance U.S. capabilities necessary for the Joint Fight. The program technology objectives include: high-speed weapon delivery, longer range precision effects, networked and collaborative systems of systems, agility at the engagement level, increased capacity / affordable munitions, survivability during delivery and target engagement, and open systems architecture. The program develops enabling technologies specific to kinetic weapon munitions (warheads, propulsion, advanced lethality mechanisms, state of the art fuzing technologies, and pioneering targeting technologies) from a Joint Service, multi-domain perspective, thus maximizing efficiencies and ensuring the development of technologies with the broadest applicability to ensure good stewardship of taxpayer dollars.

In order to maintain superior power protection capabilities against near peer adversaries, there is an urgent need to provide U.S. warfighters with augmented or new capabilities to ensure technical superiority. The program follows a threat/opportunity analysis to develop kinetic capabilities that enable scenario-based effects from a Joint Fight perspective by exploring technological advances that are beyond Service investment risk acceptance and target asymmetric advantage. The goal is to enable military dominance to ensure effective deterrence of adversary aggression.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Office of the Secretary Of Defense	Date: April 2022
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*

The program will invest in technologies that will enable U.S. warfighters to maintain or regain operational and battlefield advantages that technologies can provide through increased performance, range, and lethality to improve the Joint Force military advantages and build a more lethal force across all contested domains – air, land, sea, and space. This program's investment portfolio has been aligned to complement and utilize the Department's priority technology areas.

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	24.397	19.591	0.000	-	0.000
Current President's Budget	24.098	20.529	18.961	-	18.961
Total Adjustments	-0.299	0.938	18.961	-	18.961
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	1.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.294	-			
• Other Reprogramming	-0.005	-	-	-	-
• FFRDC	-	-0.062	-	-	-
• Adjustments to Budget Year	-	-	18.742	-	18.742
• Economic Assumption	-	-	0.219	-	0.219

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2021	FY 2022
Project: 076: *Enhanced Munitions*		
Congressional Add: *Advanced Energetics for Long Range Munitions*	5.000	-
Congressional Add: *Next Generation Explosives and Propellants*	-	1.000
Congressional Add Subtotals for Project: 076	5.000	1.000
Congressional Add Totals for all Projects	5.000	1.000

Change Summary Explanation

FY 2022 funding increase reflects $1.000 million Congressional add for Next Generation Explosives and Propellants.
FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense			Date: April 2022
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602000D8Z / *Joint Munitions Technology*	Project (Number/Name) 076 / *Enhanced Munitions*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
076: *Enhanced Munitions*	-	17.676	20.529	18.961	0.000	18.961	19.493	19.883	20.302	20.708	Continuing	Continuing

A. Mission Description and Budget Item Justification

The enhanced munitions effort investigates and develops advanced energetics concepts and explosive and propellant materials with the potential to improve the performance, range, speed, and lethality of weapons. Technologies and concepts developed will have the potential to impact multiple munitions types with wide applicability to improve the performance, lethality, speed, and range of weapons to ensure the U.S. is not outgunned and outranged on the battlefield of the future.

Through FY 2021, the Joint Enhanced Munitions Technology Program (JEMTP) investments focused on five Munition Areas: 1) High Performance Rocket Propulsion, 2) Minimum Signature Rocket Propulsion, 3) Area Effects Warheads, 4) Hard Target Effects Warheads, and 5) Gun Propulsion. Munition Area Technology Groups (MATG), under tri-service leadership, have developed technology roadmaps for each Munition Area which is used to guide investments based on goals consistent with the National Defense Strategy. The improved performance technologies developed, alone or in combination, will be incorporated in hardware, simulating real-world munitions, to demonstrate their utility and feasibility as part of Technology Transition Agreements with Program Executive Offices (PEOs).

In FY 2022, the Joint Fuze Technology Program (JFTP) and JEMTP merged and the program scope expanded to exploit technology developments, such as hypersonics, machine learning, artificial intelligence, quantum computing, and to accelerate their application to enable next generation kinetic weapons capabilities in the areas of energetic materials , advanced propulsion, warhead effects, enabling fuze technologies, and pioneering targeting technologies with a specific focus on enhancing kinetic weapons lethality, range and resultant effects. The program will retain tri-Service leadership to inform technology investments accelerating development across the Department. Investments will be informed by a threat-opportunity based analysis that focuses on developing weapons systems that exploit technology dominance to ensure military objectives in Joint Force campaign scenarios. New technology roadmaps for munition technical areas will guide investments consistent with the National Defense Strategy and inform Service technology investments.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Enhanced Munitions	12.676	19.529	18.961
Description: Enhanced Munitions enabling technologies focus on the following key areas: - Munitions Versatility: Combined and Collaborative Kinetic Effects - Munitions Readiness: Modularity, Advanced Manufacturing and Materials - Munitions Efficiency: Weapon Survivability - Munitions Effectiveness: • Munitions Kinetic and Tailorable Lethality Effects • Propulsion Systems • Target Detection and Burst Point Control			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** 076 / *Enhanced Munitions*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
In FY 2022, the JFTP merged with the JEMTP, and the program scope expanded to holistically address S&T that will enable next generation kinetic weapons capabilities, specifically, energetic materials, advanced propulsion, warhead lethal effects, enabling fuze technologies, and advanced targeting. Existing projects will be realigned to the new program structure and re-competed against potential new efforts program-wide. - Fabricate test motors with novel propellant material and validate improved performance. Conduct full scale testing on novel propulsion system to prepare for demonstration transition. - Prepare full-scale demonstration and complete testing on novel explosive initiation technique. - Develop low erosion missile nozzle using unique procedure and begin mechanical testing. - Complete structural modeling, fabrication, loading, and testing of first series improved lethality warhead. - Develop critical fuze component and munitions technologies for embedded, smart fuzes to enable networked weapons effects and precision warhead detonation. - Develop additively manufactured fuzing radome technology to enhance target detection performance and resistance to jamming in contested environments. - Develop new multi-mode ultrafast targeting algorithms exploiting advancements in microelectronics and materials. - Develop technologies to enable collaborate weapons communication and networking facilitating improved guidance, target detection, and weapons effectiveness. ***FY 2023 Plans:*** - Complete novel propellant testing and validate data to modelling and simulation results. - Finalize prototype novel missile low erosion nozzle design and conduct testing in realistic temperature regimes. - Complete characterization of novel new explosive material and formulate with novel metal fuels, to start down-selection process of formulations to enable fabrication of mid-scale samples for testing. - Complete End-to-End machine learning radar with significant improvement in Electronic Countermeasure Resistance by completing laboratory prototyping with a software defined radio and RF simulator. - Initiate machine learning based target detection design based on algorithm and database option exploration for high speed weapon fuzing. - Demonstrate target detection research with evaluation of implemented solution to determine effectiveness of enhanced technology for survivability and precise trigger timing to enhance lethality. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Changes reflect minor deviations in budget priorities.			
Accomplishments/Planned Programs Subtotals	12.676	19.529	18.961

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** 076 / *Enhanced Munitions*

	FY 2021	FY 2022
Congressional Add: Advanced Energetics for Long Range Munitions ***FY 2021 Accomplishments:*** - Explore advanced energetics concepts and accelerate development of new explosive and propellant materials to drive improvements to the performance, range, and lethality of weapons. - Application of machine learning tools and techniques for advanced energetics discovery and applied research of energetics suitable for long range/high speed munitions propellant applications.	5.000	-
Congressional Add: Next Generation Explosives and Propellants ***FY 2022 Plans:*** Explosives and propellants are crucial to address U.S. Forces capability needs for enhancing weapon lethality, range and speed against advanced adversary threats. Program increase will be used to accelerate Joint Enhanced Munitions Technology Program efforts for advanced explosives and propellants to enhance Joint Force munitions effectiveness and readiness and support future warfighting needs across all domains.	-	1.000
Congressional Adds Subtotals	5.000	1.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense			Date: April 2022
Appropriation/Budget Activity 0400 / 2	R-1 Program Element (Number/Name) PE 0602000D8Z / *Joint Munitions Technology*	Project (Number/Name) 204 / *Enabling Fuze Technology*	

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
204: *Enabling Fuze Technology*	-	6.422	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

Project 204 funding was realigned to Project 076, Enhanced Munitions, in FY 2022.

A. Mission Description and Budget Item Justification

This effort strategically develops fuze-enabling technologies needed to develop weapons that address Joint fight capability areas including ones highlighted by the Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)) Munitions Science and Technology (S&T) Joint strategy and Technology-Focused Modernization such as High Speed Weapons, Networked Munitions, Air Defense, and Scalable Lethality. This effort identifies and matures fuze enabling technologies at the laboratory scale and transitions them into Budget Activity (BA) 6.3 technology maturation and demonstration programs.

The Joint Fuze Technology Program (JFTP) investments are focused on four fuze capability areas that reflect U.S. fuzing capability gaps: 1) Extreme Environment Survivable Fuzing, 2) Tailorable Effects Fuzing and Warhead Initiation, 3) High Reliability Safe and Arm Technology, and 4) Target Detection and Burst Point Control.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Enabling Fuze Technology	6.422	-	-
Description: Enabling Fuze Technology focuses on the following areas: - Extreme Environmental Survivable Fuzing: Challenges are addressed with improved modeling and simulation (M&S) capabilities to provide the computational tools necessary to understand extreme weapon environments, test equipment, instrumentation, and analysis techniques that provide basic phenomenology and understanding of the fuze environment, and survivable fuze components developed to increase the effectiveness of hypersonic munitions by improving the prediction tools and testing methodologies to evaluate the survivability and functionality of future fuzes. Development of these technologies will enable next generation hypersonic weapon fuzes to survive and function. - Tailorable Effects Fuzing and Warhead Initiation: Develops technologies for tailorable effects weapons that encompass the ability to selectively vary the output of the weapon and the ability to generate selectable effects, initiation and multi-point technologies, electronic safe and arm based multi-point initiators, and embedded fuzing for high speed/penetrating weapons. - High Reliability Safe and Arm Technology: Develops highly reliable common fuzing architectures, miniature/high efficiency munitions power sources, and Unexploded Ordnance (UXO) reduction features. - Target Detection and Burst Point Control: Develops sensing and algorithm foundational technologies for precision target detection while meeting or exceeding the performance of existing technologies in order to operate in contested and high speed weapon environments.			
Accomplishments/Planned Programs Subtotals	6.422	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense		Date: April 2022
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602000D8Z / *Joint Munitions Technology*	**Project (Number/Name)** 204 / *Enabling Fuze Technology*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A