Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Missile Defense Agency											Date: April 2022	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603180C *I Advanced Research*							
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	178.208	29.621	47.966	22.023	-	22.023	22.758	23.296	23.851	24.335	Continuing	Continuing
MD25: *Advanced Technology Development*	173.808	28.879	47.135	21.223	-	21.223	21.957	22.500	22.955	23.415	Continuing	Continuing
MD40: *Program-Wide Support*	4.400	0.742	0.831	0.800	-	0.800	0.801	0.796	0.896	0.920	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

Decrease from FY 2022 to FY 2023 reflects the FY 2022 Congressional adds for high-speed flight experiment testing, 3D printed high temperature nickel based alloys for hypersonic applications, Benzoxazine for high-mach system thermal protection and laser weapons optics technical risk mitigation. FY 2023 is a return to baseline funding levels.

A. Mission Description and Budget Item Justification

The Advanced Research program conducts leading edge advanced research and development to create and enable future missile defense capabilities. The Missile Defense Agency (MDA) executes this mission by capitalizing on the creativity and innovation of the brightest minds in our Nation's universities; small and large businesses; national laboratories; and collaborative research partnerships between allied countries, academic institutions, and industry. In accordance with identified Agency requirements and Warfighter needs, the program assesses and demonstrates the utility of emerging component technologies. After successful maturation and demonstration activities, the program facilitates transition of the technologies to the Missile Defense System through a Commercialization and Transition Office and other MDA programs.

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	35.024	21.466	0.000	-	0.000
Current President's Budget	29.621	47.966	22.023	-	22.023
Total Adjustments	-5.403	26.500	22.023	-	22.023
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	26.500			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-5.000	0.000			
• SBIR/STTR Transfer	-0.403	0.000			
• Missile Defeat and Defense Enhancement	0.000	0.000	0.000	-	0.000
• Other Adjustment	0.000	0.000	22.023	-	22.023

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Change Summary Explanation

FY 2021 funding decrease reflects the reprogramming of a $5.0 million Congressional Plus-up to the Defense Logistics Agency (DLA) for domestic supply of strategic metals. DLA was the intended recipient of the plus-up.

Increase of $26.5 million in FY 2022 provides the Congressional Plus-up for high-speed flight experiment testing, 3D printed high temperature nickel based alloys for hypersonic applications, Benzoxazine for high-mach system thermal protection and laser weapons optics technical risk mitigation.

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 Missile Defense Agency			Date: April 2022
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603180C / *Advanced Research*	Project (Number/Name) MD25 / *Advanced Technology Development*	

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
MD25: *Advanced Technology Development*	173.808	28.879	47.135	21.223	-	21.223	21.957	22.500	22.955	23.415	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Decrease from FY 2022 to FY 2023 reflects the FY 2022 Congressional adds for high-speed flight experiment testing, 3D printed high temperature nickel based alloys for hypersonic applications, Benzoxazine for high-mach system thermal protection and laser weapons optics technical risk mitigation. FY 2023 is a return to baseline funding levels.

A. Mission Description and Budget Item Justification

The Missile Defense Agency's (MDA) Advanced Technology Development Project pursues a broad range of emerging technologies targeted for application and insertion into the Missile Defense System (MDS). MDA explores potential new MDS capabilities by leveraging the creativity and innovation of the Nation's industry, universities, and national laboratories to conduct advanced technology development. MDA also pursues advanced technology development through cooperative international research agreements between U.S. and foreign universities of allied nations. The program manages the selection process and administers the Missile Defense Small Business Innovation Research (SBIR) program element (PE), 0605502C. SBIR topics and projects are selected annually based on needs across the MDS and executed in partnership with sponsoring intra-agency organizations. These mechanisms foster a cooperative environment between small businesses, prime contractors, and MDA elements to yield reduced cost and increased returns on investment for successful technology integration efforts.

MDA's Advanced Technology Development Project assesses the feasibility and technical performance of the advanced research and development efforts through in-house means and partnerships with Department of Defense and other government agency laboratories. MDA provides independent assessments, demonstration and experimentation environments, and other concept assessment capabilities. The output of the experimentation, demonstration, and laboratory efforts provide risk, transition feasibility, and performance assessments, concept assessment data and analysis, and an overall improvement in the state-of-the-art of advanced technology evaluation. The culmination of research, development, and assessment is the commercialization and transition of promising technologies into the MDS.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023
Title: Advanced Research	28.879	47.135	21.223
Articles:	-	-	-
Description: This activity funds technology and research initiatives executed through continuous cycles of development, maturation, and assessment of component technologies identified by emerging weapon and sensor system concepts.			
Recurring tasks include:			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Missile Defense Agency		Date: April 2022
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603180C / *Advanced Research*	**Project (Number/Name)** MD25 / *Advanced Technology Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023
- Conduct systems engineering, integration, research, and materiel solution analysis to identify initiatives and technology to include missiles, sensors, and command and control components in the defense against current and future threats - Pursue advanced technology investments for defense against ballistic and non-ballistic hypersonic threats - Develop breakthrough technology and innovative solutions from private industry, qualified accredited educational institutions, and non-profit organizations to include: -- Additive manufacturing technology initiatives for interceptor propulsion and structural components -- Materials development, assessment, and processing techniques -- Advanced threat component technologies -- Electro-optical and infrared sensor and communication systems -- Radar and radio frequency communication systems -- Interceptor and space systems component technologies -- Left through right of launch integration - Assess and evaluate advanced technology investments to extract risk-reduction information and determine transition feasibility - Execute the Broad Agency Announcement addressing breakthrough technologies and innovative solutions from private industry, qualified accredited educational institutions, and non-profit organizations to include: -- Artificial intelligence related to machine learning, big data, and Decision Theory -- Computer Science, Signal and Data Processing -- Directed energy technology -- Future MDS concept development -- Kill Web Algorithms, Probability and Decision Theory -- Modeling and simulation -- Radar and radio frequency sensor systems -- Phenomenology - Utilize NanoSat technology demonstrations to conduct testing and reduce risk for new and advanced technologies for the MDS - Continue to assess incoming innovative technology whitepapers and pursue awards for those that align with Agency priorities and budget, emphasizing component technologies that address advanced threat challenges - Leverage university research opportunities including allied nations to enhance MDS advanced technology initiatives and build stronger relationships with allies and partners - Manage the selection process of SBIR and technology application programs to assist MDA funded technology developers in finding and entering technology transfer opportunities to missile defense applications Specific and/or unique accomplishment to each FY are as follows: ***FY 2022 Plans:*** - Assess incoming innovative technology whitepapers and pursue awards for those that align with Agency priorities and budget			

Exhibit R-2A, RDT&E Project Justification: PB 2023 Missile Defense Agency		Date: April 2022
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603180C / *Advanced Research*	**Project (Number/Name)** MD25 / *Advanced Technology Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023
- NanoSat Testbed Initiative: collect and analyze on-orbit mission data from communication architectures experiments, initiate next series of experimentation focused on improved engagement management techniques - High Temperature Seeker Window Assessment: Mature and evaluate seeker windows that support existing and future missions - Develop process for producing Ni powders and printing Ni-based alloys for hypersonics. Integrate production process that spans powder production through finished product in single machine. - Create new domestic production capacity for composite resin precursors chemicals. Become merchant-supplier of critical hypersonic material to the defense industrial base. - Develop design tools, processes, and assembly prototypes. Expand the current industrial supply base, reduce lead times, and costs of adaptive optic systems. - Develop and test new booster phase vehicle capable of hosting weapon system component technologies applicable to future interceptor systems and flying extended duration experiments in the hypersonic domain. Improved rocket technology for boost phase, improved technology for longer duration and higher velocity in the hypersonic domain - Mature 3D printing of nickel based alloys for hypersonic components to improve performance and manufacturability - Investigate Benzoxanine as a high char yield resin for Carbon/Carbon applications that improve processing timelines - Laser weapon optics tech risk mitigation ***FY 2023 Plans:*** - Continue NanoSat Testbed Initiative: collect and analyze on-orbit mission data from communication architectures experiments. Continue next series of experimentation focused on improved engagement management techniques, enhanced security, and reduced latency with increased throughput - Continue High Temperature Seeker Window Assessment by developing and characterizing advanced materials, radiation hardened components, and experimentation in relevant environments ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Decrease from FY 2022 to FY 2023 reflects the FY 2022 Congressional adds for high-speed flight experiment testing, 3D printed high temperature nickel based alloys for hypersonic applications, Benzoxazine for high-mach system thermal protection and laser weapons optics technical risk mitigation. FY 2023 is a return to baseline funding levels.			
Accomplishments/Planned Programs Subtotals	28.879	47.135	21.223

Exhibit R-2A, RDT&E Project Justification: PB 2023 Missile Defense Agency		Date: April 2022
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603180C / *Advanced Research*	**Project (Number/Name)** MD25 / *Advanced Technology Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	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
• 0603176C: *Advanced Concepts and Performance Assessment*	49.069	40.000	16.737	-	16.737	17.265	17.693	18.109	18.477	Continuing	Continuing
• 0603294C: *Common Kill Vehicle Technology*	10.793	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.793
• 0604181C: *Hypersonic Defense*	267.589	287.796	225.477	-	225.477	108.540	110.220	287.535	449.590	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy to conduct these technology development agreements consists of partnering with accredited universities, small businesses, and nonprofit organizations. MDA awards competitive procurements via the MDA Innovation, Science, and Technology Broad Agency Announcement (IST BAA) and the Small Business Innovative Research and the Small Business Technology Transfer program.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Missile Defense Agency			Date: April 2022
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603180C / *Advanced Research*	Project (Number/Name) MD40 / *Program-Wide Support*	

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
MD40: *Program-Wide Support*	4.400	0.742	0.831	0.800	-	0.800	0.801	0.796	0.896	0.920	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

PWS contains non-headquarters management costs in support of MDA functions and activities across the entire MDS. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the MDS as well as supports MDA in the development and evaluation of technologies that will respond to the changing threat. Additionally, PWS includes personnel to support global deployments performing deployment site preparation and activation, and provides facility capabilities for MDA Executing Agent locations worldwide. Other MDA wide costs include: physical and technical security; civilian drug testing; audit readiness; the Science, Technology, Engineering, and Mathematics (STEM) program; legal services and settlements; travel and agency training; office, equipment, vehicle, and warehouse leases; utilities and base operations across multiple geographic locations; commercial and ancillary facility services; management of all facility aspects regardless of lifecycle stage; supplies and maintenance; compliance with statutory environmental requirements; data and unified communications support; materiel and readiness and central property management of equipment; Facilities Sustainment, Restoration and Modernization (FSRM) program, (formerly Real Property Maintenance) to keep the Department's inventory of facilities in good working order; and similar operating expenses. PWS is allocated on a pro-rata basis across most Agency PEs and therefore fluctuates per PE by fiscal year based on the total Agency budget in that fiscal year.