Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Missile Defense Agency											Date: March 2023	
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 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	207.829	51.270	85.323	21.461	-	21.461	22.024	22.571	23.031	23.591	Continuing	Continuing
MD25: *Advanced Technology Development*	202.687	50.439	84.523	20.698	-	20.698	21.231	21.659	22.097	22.545	Continuing	Continuing
MD40: *Program-Wide Support*	5.142	0.831	0.800	0.763	-	0.763	0.793	0.912	0.934	1.046	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

The decrease from FY 2023 to FY 2024 reflects Congressional add of $63.3 million enacted in FY 2023.

A. Mission Description and Budget Item Justification

The Advanced Research Program conducts leading edge technology research and development efforts to 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, other government agencies, and allied countries. 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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	47.966	22.023	22.758	-	22.758
Current President's Budget	51.270	85.323	21.461	-	21.461
Total Adjustments	3.304	63.300	-1.297	-	-1.297
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	63.300			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.364	0.000			
• Other Adjustment	3.668	0.000	-1.297	-	-1.297

Change Summary Explanation

Decrease in FY24 reflects the reduction in civilian labor to align MDA workforce demands.

Congressional Add Details

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Missile Defense Agency	Date: March 2023
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*

Project: MD25 Advanced Technology Development

FY 2023 Congressional Adds Total $63.3 million
- Hypersonic testbed acceleration ($25 million)
- Sounding Rocket Testbed Technology Maturation Tests ($10 million)
- Benzoxazine High-Mach System Thermal Protection ($8 million)
- High temp nickel based alloys for hypersonic applications ($6 million)
- Sounding rocket vehicle high speed testbed tech ($6 million)
- Hypersonic interceptor component technology ($4.3 million)
- Laser weapons optics tech risk mitigation ($4 million)

Exhibit R-2A, RDT&E Project Justification: PB 2024 Missile Defense Agency			Date: March 2023
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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MD25: *Advanced Technology Development*	202.687	50.439	84.523	20.698	-	20.698	21.231	21.659	22.097	22.545	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The decrease from FY 2023 to FY 2024 reflects Congressional add of $63.3 million enacted in FY 2023.

A. Mission Description and Budget Item Justification

The Missile Defense Agency's (MDA) Advanced Technology Development Program pursues a broad range of emerging technologies targeted for application into the Missile Defense System. MDA explores potential new Missile Defense System capabilities by leveraging the creativity and innovation of the Nation's industry, universities, and national laboratories to develop advanced technologies. 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 Missile Defense System 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 reduction, transition feasibility, 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 Missile Defense System.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024
Title: Advanced Research	50.439	84.523	20.698
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: - Conduct systems engineering, integration, research, and material solution analysis to identify initiatives and technology to include missiles, sensors, and command and control components in the defense against current and future threats			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Missile Defense Agency		Date: March 2023
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 2022	FY 2023	FY 2024
- 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 -- Electra-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 (BAA) 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 Missile Defense System concept development -- Kill Web Algorithms, Probability and Decision Theory -- Modeling and simulation -- Radar and radio frequency sensor systems -- Phenomenology - Utilize NanoSat technology demonstrations and sounding rockets to conduct testing and reduce risk for new and advanced technologies for the Missile Defense System - Continue to assess incoming innovative technology white papers 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 Missile Defense System 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 2023 Plans:*** Congressional Add: Hypersonic testbed acceleration ($25 million) - Launch initial Hypersonic Testbed with technology demonstration experiments/payloads			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Missile Defense Agency		Date: March 2023
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 2022	FY 2023	FY 2024
- Continue efforts to develop and launch a modular hypersonic vehicle capable of increased Mach Number and longer flight times - Demonstrate advanced components technology capability in hypersonic environment Congressional Add: Sounding rocket hypersonics testing ($10 million) - Provide technology development to develop and test a modular hypersonic vehicle capable of hosting weapon system component technologies applicable to future interceptor systems and flying component technology experiments in the hypersonic domain Congressional Add: Benzoxazine for high-mach system thermal protection ($8 million). - Continue development of benzoxazine formulations for multiple resins for the production of lower-cost, quicker-yield carbon/ carbon composites. - Develop scalable resin precursor chemical production for a domestic source of critical chemicals for benzoxazine production. Congressional Add: High temperature nickel-based alloys for hypersonic applications ($6 million) - Continue development with a leading nickel-based alloy powder manufacturer on additive manufacturing of challenging, high precision components. Congressional Add: Sounding rocket vehicle high speed testbed technology ($6 million) - Develop and test component technology in hypersonic environments via ground testing and sounding rockets tests Congressional Add: Hypersonic interceptor component technology ($4.3 million) - Continue developing, testing and characterizing advanced hypersonic component technology to include seeker window materials, thermal protection systems, aero optics and jet interaction capability Congressional Add: Laser weapons optics technology risk mitigation ($4 million) - Continue development of a chemical vapor composite silicon carbide Adaptive Optic system. - Test tactical prototype in long range, representative application environment. - 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			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Missile Defense Agency		Date: March 2023
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 2022	FY 2023	FY 2024
- Continue sounding rocket testbed maturation for hypersonic testing of high temperature material concepts (seeker window systems thermal protection systems, nose tip technology) ***FY 2024 Plans:*** - Continue NanoSat Testbed Initiative: Commence next series of experimentation focused on improved engagement management techniques - Continue High Temperature Seeker Window Assessment: Mature and evaluate seeker windows that support existing and future missions ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Decrease from FY 2023 to FY 2024 reflects the FY 2023 Congressional add.			
Accomplishments/Planned Programs Subtotals	50.439	84.523	20.698

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	39.678	39.737	17.825	-	17.825	18.301	18.752	19.134	19.596	Continuing	Continuing
• 0604181C: *Hypersonic Defense*	281.886	517.977	208.997	-	208.997	218.939	294.326	366.951	644.996	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy to conduct 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 and the Small Business Innovative Research and the Small Business Technology Transfer program.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Missile Defense Agency			Date: March 2023
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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
MD40: *Program-Wide Support*	5.142	0.831	0.800	0.763	-	0.763	0.793	0.912	0.934	1.046	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 Missile Defense System. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the Missile Defense System 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.