Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Missile Defense Agency											Date: February 2020	
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 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	108.942	42.100	27.674	18.687	-	18.687	18.883	18.975	19.720	20.222	Continuing	Continuing
MD25: *Advanced Technology Development*	106.327	41.196	26.793	17.945	-	17.945	18.134	18.212	18.711	19.119	Continuing	Continuing
MD40: *Program-Wide Support*	2.615	0.904	0.881	0.742	-	0.742	0.749	0.763	1.009	1.103	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

Decrease from FY 2019 to FY 2020 reflects the FY 2019 Congressional add of $22.200 million to accelerate Hypersonic Defense (HD) technologies to raise the Technology Readiness Levels of new hypersonic components and to integrate into the HD architecture to include: kinetic, non-kinetic, sensors, communications, command and control (C2), propulsion and modeling and simulation (M&S). Decrease from FY 2020 to FY 2021 reflects the $7 million Congressional add in FY 2020 for Advanced Carbon Composites Manufacturing.

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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	42.565	20.674	21.154	-	21.154
Current President's Budget	42.100	27.674	18.687	-	18.687
Total Adjustments	-0.465	7.000	-2.467	-	-2.467
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	7.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.465	0.000			
• Missile Defeat and Defense Enhancement	0.000	0.000	0.000	-	0.000

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• Other Adjustment	0.000	0.000	-2.467	-	-2.467

Change Summary Explanation

Increase in FY 2020 reflects the Congressional add for Advanced Carbon Composite Manufacturing.

Decrease in FY 2021 reflects the Agency priorities for reduction of civilian labor.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
MD25: *Advanced Technology Development*	106.327	41.196	26.793	17.945	-	17.945	18.134	18.212	18.711	19.119	Continuing	Continuing

Note

Decrease from FY 2019 to FY 2020 reflects the FY 2019 Congressional add of $22.200 million to accelerate Hypersonic Defense (HD) technologies to raise the Technology Readiness Levels of new hypersonic components and to integrate into the HD architecture to include: kinetic, non-kinetic, sensors, communications, command and control (C2), propulsion and modeling and simulation (M&S). Decrease from FY 2020 to FY 2021 reflects the $7 million Congressional add in FY 2020 for Advanced Carbon Composites Manufacturing.

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)	FY 2019	FY 2020	FY 2021
Title: Advanced Research	41.196	26.793	17.945
Description: This activity funds technology and research initiatives. - 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 non-ballistic hypersonic threats - Utilize NanoSat technology demonstrations to conduct testing and reduce risk for new and advanced technologies for the MDS - Leverage university to university international research opportunities with allied nations to enhance MDS advanced technology initiatives and build stronger relationships with allies and partners			

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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)	FY 2019	FY 2020	FY 2021
- 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 - Assess and evaluate advanced technology investments to extract risk-reduction information and determine transition feasibility Specific and/or unique accomplishments to each FY are as follows: ***FY 2020 Plans:*** - Sponsor breakthrough technology and innovative solutions from private industry, qualified accredited domestic educational institutions, and non-profit organizations, using the Advanced Technology Innovation Broad Agency Announcement (BAA), for example: -- Additive manufacturing technology initiatives for interceptor propulsion and structural components -- Space & sensor technology -- Directed energy technology -- Radar systems -- Electro-Optical Infrared sensor systems -- Computer science, signal, and data processing -- Mechanical and aerospace engineering -- Left through right of launch integration -- Decision theory -- Modeling & Simulation (M&S) -- Interceptor technology -- Future MDS concept development -- 3D printing of diamond composite structures -- HD component technologies --- Technology development to raise Technology Readiness Level (TRL) of new hypersonic components and integrate into the HD architecture ---- Kinetic ---- Non-kinetic ---- Sensors ---- Communications ---- C2 ---- M&S - Nanosat Testbed Initiative: providing risk reduction in the development of new and advanced technologies, in support of the MDS, by testing and demonstrating capabilities under realistic environmental conditions			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
- Mature component technology and reduce technology risk using sounding rockets to demonstrate interceptor in a relevant environment ***FY 2021 Plans:*** - Sponsor and assess breakthrough technology and innovative solutions from private industry, qualified accredited domestic educational institutions, and non-profit organizations, for topics focused on, but not limited to the following: -- Additive manufacturing technology initiatives for interceptor propulsion and structural components -- Advanced threat component technologies -- Artificial intelligence, machine learning, Big Data -- Computer science, signal, and data processing -- Directed energy technology -- Disruptive technology -- Electro-Optical Infrared sensor and communication systems -- Future MDS concept development -- International MDS Cooperation -- Interceptor and space systems -- Left through right of launch integration -- Materials and processing -- Mathematics, probability, and decision theory -- Mechanical and aerospace engineering -- M&S -- Phenomenology -- Radar and radio frequency communication systems -- Space & sensor technology - NanoSat Testbed Initiative: provide risk reduction in the development of new and advanced technologies, in support of the MDS, by testing and demonstrating capabilities under realistic environmental conditions -- Mature component technology and reduce technology risk using sounding rockets to demonstrate interceptor technology in a relevant environment - High Temperature Seeker Window Development: Mature and evaluate seeker windows that support existing and future missions.			

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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)	FY 2019	FY 2020	FY 2021
- Conduct fundamental material development, modeling and simulation, and low and high fidelity testing. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The decrease from FY 2020 to FY 2021 reflects the FY 2020 Congressional add for Advanced Carbon Composites Manufacturing.			
Accomplishments/Planned Programs Subtotals	41.196	26.793	17.945

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	12.720	46.201	14.910	-	14.910	15.178	16.205	16.879	17.300	Continuing	Continuing
• 0603178C: *Weapons Technology*	13.400	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603294C: *Common Kill Vehicle Technology*	55.549	13.600	11.058	-	11.058	10.996	11.052	11.290	11.563	Continuing	Continuing
• 0604181C: *Hypersonic Defense*	132.612	390.204	206.832	-	206.832	107.521	111.084	115.487	118.333	Continuing	Continuing

Remarks

D. Acquisition Strategy

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

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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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
MD40: *Program-Wide Support*	2.615	0.904	0.881	0.742	-	0.742	0.749	0.763	1.009	1.103	Continuing	Continuing

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.