Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Missile Defense Agency											Date: March 2019	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	64.073	163.947	316.822	303.458	-	303.458	336.139	380.195	300.126	201.668	Continuing	Continuing
MD98: *Directed Energy Demonstrator Development*	10.395	81.179	224.317	116.266	-	116.266	110.697	125.704	172.040	136.171	Continuing	Continuing
MD94: *Neutral Particle Beam (NPB)*	-	0.000	0.000	34.000	-	34.000	142.950	177.250	25.800	0.000	0.000	380.000
MD99: *Discrimination Sensor Demonstrator Development*	37.622	71.111	78.608	132.187	-	132.187	73.619	65.914	92.394	56.045	Continuing	Continuing
MT99: *Technology Maturation Initiatives Test*	6.918	4.974	1.982	11.262	-	11.262	1.684	4.145	0.824	0.000	0.000	31.789
MC98: *Cyber Operations*	0.471	0.162	5.254	0.475	-	0.475	0.477	0.467	0.472	0.478	Continuing	Continuing
MD40: *Program Wide Support*	8.667	6.521	6.661	9.268	-	9.268	6.712	6.715	8.596	8.974	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

Increase in FY 2019 reflects congressional adjustments to continue research and development for three separate laser scaling efforts, to retain three performers for Low Power Laser Demonstrator (LPLD) through Critical Design Review (CDR) and to address cyber threats.

Increase in FY 2020 provides the continued Electro Optical/Infrared (EO/IR) participation in Ballistic Missile Defense System (BMDS) level tests and the addition of Neutral Particle Beam (NPB), a new directed energy capability to defeat the emerging threat.

A. Mission Description and Budget Item Justification

Technology Maturation Initiatives (TMI) demonstrates the utility of directed energy for missile defense. MDA's directed energy plan incrementally demonstrates and improves the constituent components required to execute a directed energy kill chain; acquisition, tracking and lethality. The efforts shape future BMDS acquisition choice by advancing the technology readiness levels of emerging and developing technology, while simultaneously assessing the performance and contributions to the BMDS architecture. TMI includes development, demonstration, systems engineering and test efforts to improve performance of lasers, EO/IR sensors, and disruptive directed energy concepts

MDA will develop cost effective technology demonstrators to address specific risks:
- An advanced sensor integrated into an airborne or space platform to provide discrimination of lethal objects and other advanced sensor applications
- A compact, ruggedized advanced sensor that builds on the airborne discrimination program to demonstrate persistent overhead discrimination coverage from space
- Sensor system tests to validate performance against emerging advanced threats

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Missile Defense Agency	Date: March 2019
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604115C *I Technology Maturation Initiatives*

- Component technology development leading to future advancements of strategic laser weapons
- Technology risk reduction for a disruptive directed energy concept

The Directed Energy Demonstrator Development (DEDD) addresses technology risk reduction and maturation for high powered strategic lasers as well as beam control and steering. The laser scaling effort is tightly coupled with the Office of the Assistant Secretary of Defense for Research and Engineering (ASD R&E) Laser Road map, and is essential to mature strategic laser technology sufficient to enter into the ASD R&E approach. Once strategic laser concepts meet the minimum requirements, they can be transitioned into the R&E laser scaling program for further development.

The Neutral Particle Beam is a game changing space-based directed energy capability for strategic and regional missile defense. MDA will design, develop and conduct a feasibility demonstration of a first stage accelerator subsystem.

The Discrimination Sensor Demonstrator Development (DSDD) program includes the development of an advanced sensor to discriminate lethal objects and uses MDA configured airborne platforms to introduce EO/IR sensors into the BMDS. The advanced sensor incorporates incrementally developed, integrated, and tested next-generation sensors and electronics to demonstrate Launch-on-Remote, Engage-on-Remote, discrimination and handover improvements for missile defense from the air and/or space. These advanced sensors improve the probability of engagement success for stressing threats, expand the Ballistic Missile Defense (BMD) battle space and increase the ability to negate larger raid sizes. The MDA configured airborne platforms are used to obtain additional EO/IR data by tracking targets in MDA flight tests. They also help develop the associated concept of operations and provide the basis for a quick reaction precision tracking capability to augment radar. To address emerging advanced threats, MDA may use MDA-configured airborne platforms to support hypersonic threat testing scenarios.

TMI Test and Cyber Operations provide enabling capabilities to support all directed energy technical maturation initiatives.

MDA collaborates with the ASD R&E, the Defense Advanced Research Projects Agency (DARPA), the High Energy Laser Joint Technology Office, Department of Energy, and the Air Force, and national laboratories in a systems engineering based strategy to research, develop and test directed energy weapons technology. MDA is developing a set of common core disruptive technologies that will enable both missile defense and air dominance missions.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Missile Defense Agency	Date: March 2019
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604115C *I Technology Maturation Initiatives*

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	128.406	148.822	172.423	-	172.423
Current President's Budget	163.947	316.822	303.458	-	303.458
Total Adjustments	35.541	168.000	131.035	-	131.035
• Congressional General Reductions	-0.700	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	90.000			
• Congressional Directed Transfers	36.000	78.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.702	0.000			
• Missile Defeat and Defense Enhancement	0.000	0.000	0.000	-	0.000
• Other Adjustment	3.943	0.000	131.035	-	131.035

Change Summary Explanation

Increase in FY 2018 from PB19 to PB20 reflects the enacted congressional adjustments for retaining three vendors for the Low Power Laser Demonstrator (LPLD).

Increase in FY 2019 from PB19 to PB20 reflects the enacted congressional adjustments to continue research and development for three separate laser scaling efforts, to retain three performers for LPLD through Critical Design Review (CDR), and to address cyber threats.

Increase in FY 2020 from PB19 to PB20 provides for the addition of the Neutral Particle Beam (NPB), a new directed energy capability to defeat the emerging threat, laser scaling, and Electro Optical/Infrared (EO/IR) participation in Ballistic Missile Defense System (BMDS) level tests.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MD98 / *Directed Energy Demonstrator Development*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MD98: *Directed Energy Demonstrator Development*	10.395	81.179	224.317	116.266	-	116.266	110.697	125.704	172.040	136.171	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Decrease from FY 2019 to FY 2020 reflects the Department's priorities for laser scaling.

A. Mission Description and Budget Item Justification

The DEDD project develops, integrates, and tests the component technologies required to demonstrate the complete acquisition, tracking and lethality engagement sequence of a high energy laser system for missile defense. Laser scaling focuses on maturing strategic laser capability to levels sufficient to enter into the ASD R&E Laser Scaling Road map efforts. The DEDD project provides the necessary technology, test data, and operations familiarity to successfully transition to a higher power directed energy weapon.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
Title: Directed Energy Demonstrator Development	81.179	224.317	116.266
Articles:	-	-	-
Description: Laser scaling develops, integrates, and tests the component technologies required to demonstrate the complete acquisition, tracking and lethality engagement sequence of a high energy strategic laser system. MDA will maintain partnerships with Industry and National Laboratories to focus on laser scaling, the highest technology risk.			
Specific and/or unique planned accomplishments to each FY are as follows:			
FY 2019 Plans:			
Incrementally develop scalable, efficient, and compact high-energy laser components for integration into high power systems			
- Demonstrate robust high power diodes			
- Complete beam quality measurement of a next generation Diode Pumped Alkali Laser (DPAL)			
- Complete Fiber Combining Laser (FCL) beam quality and power demonstration			
- Complete Distributed Gain Laser (DGL) concept design			
Continue the LPLD design work, retaining three performers through CDR			
- Conduct a CDR			
-- Complete final engineering analysis			
-- Complete test planning requirements			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
-- Complete beam control, laser, and platform interface drawings			
FY 2020 Plans: Continue to develop scalable, efficient, and compact high-energy laser components for integration into high power systems - Maintain partnerships with Industry and National Laboratories to focus on laser scaling. - Perform component and sub-assembly testing, including pump diode integration design and test - Finish detailed engineering drawing for components - Verify DPAL power maturation, while maintaining beam quality demonstrated in the prior year - Conduct DPAL preliminary design review (PDR) - Verify FCL power maturation, while maintaining beam quality demonstrated in the prior year - Conduct FCL PDR - Conduct FCL laboratory demonstration - Conduct DGL PDR - Conduct DGL laboratory demonstration			
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease from FY 2019 to FY 2020 reflects the Department's priorities for laser scaling.			
Accomplishments/Planned Programs Subtotals	81.179	224.317	116.266

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	17.683	13.017	14.208	-	14.208	14.904	15.142	16.262	16.574	Continuing	Continuing
• 0603178C: *Weapons Technology*	28.894	13.400	10.000	-	10.000	10.000	10.000	0.000	0.000	Continuing	Continuing
• 0603180C: *Advanced Research*	23.765	42.565	20.674	-	20.674	21.154	21.521	22.041	22.465	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy consists of contracts to industry via the Advanced Technology Innovation Broad Agency Announcement (BAA) and competitive procurement(s) and agreements with FFRDCs and National Laboratories. MDA will leverage agency partner subject matter experts and use government model based assessments for Better Buying Power 3.0 philosophy acquisition decisions.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Directed Energy Demonstrator Development - Industry Laser Scaling	C/CPFF	TBD : TBD	0.000	0.000		0.000		54.320	Jan 2020	-		54.320	Continuing	Continuing	Continuing
Directed Energy Demonstrator Development - LPLD Preliminary Design A	C/CPFF	Lockheed Martin : CA	3.588	20.550	Nov 2017	12.404	Nov 2018	0.000		-		0.000	0.000	36.542	0.000
Directed Energy Demonstrator Development - LPLD Preliminary Design B	C/CPFF	General Atomics : CA	1.000	22.728	Nov 2017	10.157	Nov 2018	0.000		-		0.000	0.000	33.885	0.000
Directed Energy Demonstrator Development - LPLD Preliminary Design C	C/CPFF	Boeing : CA	0.000	23.261	Nov 2017	10.414	Nov 2018	0.000		-		0.000	0.000	33.675	0.000
Directed Energy Demonstrator Development - LPLD System Critical Design A	C/CPFF	Lockheed Martin : CA	0.000	0.000		26.000	Feb 2019	0.000		-		0.000	0.000	26.000	0.000
Directed Energy Demonstrator Development - LPLD System Critical Design B	C/CPFF	General Atomics : CA	0.000	0.000		26.000	Feb 2019	0.000		-		0.000	0.000	26.000	0.000
Directed Energy Demonstrator Development - LPLD System Critical Design C	C/CPFF	Boeing : CA	0.000	0.000		26.000	Feb 2019	0.000		-		0.000	0.000	26.000	0.000
Directed Energy Demonstrator Development - Laser Build/ Test	C/CPFF	TBD : TBD	0.000	0.000		12.619	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Directed Energy Demonstrator	C/CPFF	General Atomics, AFRL, Redstone Testing Center,	0.000	3.089	Jun 2018	0.756	Dec 2018	0.000		-		0.000	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development - Laser Lethality Demonstration		White Sand Missile Range : CA, AL, NM													
Directed Energy Demonstrator Development - Laser Scaling	C/Various	MIT, LL, LLNL : GA, MA, CA	0.000	0.000		85.000	Feb 2019	50.000	Feb 2020	-		50.000	Continuing	Continuing	Continuing
Directed Energy Demonstrator Development - Technology Transfer/Component Development	MIPR	MIT LL, LLNL, AF : MA, CA, NM	4.212	6.090	Oct 2017	4.750	Feb 2019	4.847	Feb 2020	-		4.847	Continuing	Continuing	Continuing
		Subtotal	8.800	75.718		214.100		109.167		-		109.167	Continuing	Continuing	N/A

Remarks

N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Directed Energy Demonstrator Development - Advisory and Assistance Services	C/CPFF	MDA Multi : AL, NM	0.000	0.000		5.148	Oct 2018	0.000		-		0.000	Continuing	Continuing	Continuing
Directed Energy Demonstrator Development - Civilian Salaries and Travel	Allot	MDA Multi : AL, NM	0.000	0.000		0.000		0.228	Oct 2019	-		0.228	Continuing	Continuing	Continuing
Directed Energy Demonstrator Development - Engineering and Technical Services	MIPR	Aviation and Missile Research Development and Engineering Center (AMRDEC), Combat Capabilities	0.950	1.271		0.000		1.590	Oct 2019	-		1.590	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Development Command - Aviation and Missile Center (CCDC-AMC) : AL													
Directed Energy Demonstrator Development - FFRDC	MIPR	Aerospace : AL, NM	0.395	1.055	Nov 2017	0.000		0.760	Nov 2019	-		0.760	Continuing	Continuing	Continuing
Directed Energy Demonstrator Development - Facility Support	Various	377th ABW, Phoenix : NM	0.000	0.150		0.141	Dec 2018	0.153	Nov 2019	-		0.153	Continuing	Continuing	Continuing
Directed Energy Demonstrator Development - Facility Sustainment	C/CPFF	TBD : AL, NM	0.000	0.000		0.800	May 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Directed Energy Demonstrator Development - Information Technology	C/CPFF	Northrop Grumman, Jacobs Technology : CO	0.000	1.031		0.718	Nov 2018	0.890	Nov 2019	-		0.890	Continuing	Continuing	Continuing
Directed Energy Demonstrator Development - Performance Analysis	MIPR	MIT LL, Aviation and Missile Research Development and Engineering Center (AMRDEC),Combat Capabilities Development Command - Aviation and Missile Center (CCDC-AMC) : MA, AL	0.250	1.954	Jan 2018	3.410	Dec 2018	3.478	Jan 2020	-		3.478	Continuing	Continuing	Continuing
		Subtotal	1.595	5.461		10.217		7.099		-		7.099	Continuing	Continuing	N/A

Remarks

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	10.395	81.179		224.317		116.266		-		116.266	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

Significant Event Complete ▲ | Milestone Decision Complete ★ | Element Test Complete ◆ | System Level Test Complete ● | Complete Activity ✦
Significant Event Planned △ | Milestone Decision Planned ☆ | Element Test Planned ◇ | System Level Test Planned ○ | Planned Activity ✧

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
LPLD PDR				▲																								
LPLD CDR								△																				
Laser Scaling Concept Design and Evaluation - Distributed Gain Laser								△																				
Laser Scaling Beam Quality and Power Demonstration - Fiber Combined Laser								△																				
Laser Scaling Beam Quality Measurement - Diode Pumped Alkali Laser								△																				
Industry Laser Scaling									✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧								
Laser Scaling DGL Laboratory Demonstration										△																		
Industry Laser Scaling Technology Design Review										△																		
Laser Scaling DPAL and FCL Preliminary Design Review												△																
Industry Laser Scaling Technology Design Review II												△																
Laser Scaling FCL Laboratory Demonstration													△															
Laser Scaling DPAL Laboratory Demonstration															△													
Industry Laser Scaling Prototype Build & Integration																△												
Industry Laser Scaling First Light																		△										
Industry Laser Scaling Independent Power & Beam Quality Assessment																		△										
Complete Transition of National Laboratory Technologies to Industry																			☆									
Strategic Laser Build																			✧	✧	✧	✧	✧	✧	✧	✧	✧	✧

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD98 / *Directed Energy Demonstrator Development*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
LPLD PDR	4	2018	4	2018
LPLD CDR	4	2019	4	2019
Laser Scaling Concept Design and Evaluation - Distributed Gain Laser	4	2019	4	2019
Laser Scaling Beam Quality and Power Demonstration - Fiber Combined Laser	4	2019	4	2019
Laser Scaling Beam Quality Measurement - Diode Pumped Alkali Laser	4	2019	4	2019
Industry Laser Scaling	1	2020	4	2022
Laser Scaling DGL Laboratory Demonstration	2	2020	2	2020
Industry Laser Scaling Technology Design Review	2	2020	2	2020
Laser Scaling DPAL and FCL Preliminary Design Review	4	2020	4	2020
Industry Laser Scaling Technology Design Review II	4	2020	4	2020
Laser Scaling FCL Laboratory Demonstration	2	2021	2	2021
Laser Scaling DPAL Laboratory Demonstration	4	2021	4	2021
Industry Laser Scaling Prototype Build & Integration	1	2022	1	2022
Industry Laser Scaling First Light	3	2022	3	2022
Industry Laser Scaling Independent Power & Beam Quality Assessment	3	2022	3	2022
Complete Transition of National Laboratory Technologies to Industry	4	2022	4	2022
Strategic Laser Build	4	2022	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MD94 / *Neutral Particle Beam (NPB)*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MD94: *Neutral Particle Beam (NPB)*	-	0.000	0.000	34.000	-	34.000	142.950	177.250	25.800	0.000	0.000	380.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Increase from FY 2019 to FY 2020 reflects the addition of the Neutral Particle Beam (NPB), a directed energy capability to defeat the emerging threat.

A. Mission Description and Budget Item Justification

The NPB provides a game changing space-based directed energy weapon capability for strategic missile defense. MDA explores game changing approaches that address the evolving threat to the homeland.

The NPB initiative will consist of a robust systems engineering process and continued cost and programmatic refinements as the concept and technologies mature. The NPB is planned to be a proof of concept culminating in an initial on-orbit space prototype demonstration of the NPB capability in FY 2023. The early NPB work includes design, development, and conducting a feasibility demonstration of a first stage accelerator subsystem.

The NPB neutralizer, system power, and thermal management are the key technology sub-components to be matured to lower risks for early demonstration.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
Title: Neutral Particle Beam	0.000	0.000	34.000
Articles:	-	-	-
Description: The NPB is a space-based, directed energy capability for homeland defense, providing a defense for boost phase and mid-course phase. A beam of neutral particles bombards its target with energy sufficient to disrupt, incapacitate, or kill the threat.			
Specific and/or unique planned accomplishments to each FY are as follows:			
FY 2019 Plans: N/A			
FY 2020 Plans: - Conduct detailed systems engineering design and lethality requirements trade studies - Conduct technology risk assessment, establish technical risk baseline for initial and follow-on development phases, and align program plan to mitigate risk			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD94 / *Neutral Particle Beam (NPB)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
- Design and develop low size, weight, and power prototype technologies - Initiate plans to demonstrate beam generation, first stage acceleration, beam steering, pointing and neutralization, instrumentation and controls, radio frequency and platform prime power, and thermal management subsystem technologies - Incrementally build-up demonstrator technologies in a laboratory environment - Prepare for a feasibility demonstration of the first stage accelerator subsystem - Explore new and innovative directed energy concepts and technology - Develop government reference concepts for independent performance predictions via government simulations to establish baseline for prototype assessments ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 provides the addition of the NPB, a directed energy capability to defeat the emerging threat.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	34.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	17.683	13.017	14.208	-	14.208	14.904	15.142	16.262	16.574	Continuing	Continuing
• 0603180C: *Advanced Research*	23.765	42.565	20.674	-	20.674	21.154	21.521	22.041	22.465	Continuing	Continuing
• 0603890C: *BMD Enabling Programs*	533.993	620.831	571.507	-	571.507	603.672	541.667	574.553	553.969	Continuing	Continuing
• 0604115C: *Technology Maturation Initiatives*	163.947	316.822	303.458	-	303.458	336.139	380.195	300.126	201.668	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy consists of partnering with industry, other Government Agencies, FFRDCs and University Affiliated Research Centers. MDA will leverage agency and partner subject matter experts and use government model based assessments to inform Better Buying Power philosophy acquisition decisions. MDA will then award contracts to industry and universities via competitive procurements to develop and demonstrate promising components and integrated systems in realistic test environments.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD94 / *Neutral Particle Beam (NPB)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Neutral Particle Beam - Neutral Particle Beam - Various	Various	Various : TBD	0.000	0.000		0.000		34.000	Dec 2019	-		34.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		34.000		-		34.000	Continuing	Continuing	N/A

Remarks

N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		34.000		-		34.000	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD94 / *Neutral Particle Beam (NPB)*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
Concept Development									✧	✧	✧	✧																
Systems Evaluation and Lab Demonstration									✧	✧	✧	✧	✧	✧	✧	✧	✧	✧										
Relevant Environment Engineering and Development									✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧					
Design Review 1										△																		
Design Review 2												△																
On Orbit Space Demonstration																							△					

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD94 / *Neutral Particle Beam (NPB)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Concept Development	1	2020	4	2020
Systems Evaluation and Lab Demonstration	1	2020	2	2022
Relevant Environment Engineering and Development	1	2020	3	2023
Design Review 1	2	2020	2	2020
Design Review 2	4	2020	4	2020
On Orbit Space Demonstration	3	2023	3	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MD99 / *Discrimination Sensor Demonstrator Development*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MD99: *Discrimination Sensor Demonstrator Development*	37.622	71.111	78.608	132.187	-	132.187	73.619	65.914	92.394	56.045	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Increase in FY 2019 to FY 2020 provides for increased participation in EO/IR tests through aircraft lease and ground support costs for BMDS level tests and flight qualification efforts leading to advanced sensor flight tests.

A. Mission Description and Budget Item Justification

Areas of concentration include tracking lasers, advanced detectors, infrared sensors, and precision tracking and discrimination algorithms. DSDD demonstrates precision track of advanced threats at extended ranges, simple scene discrimination, and then complex scene discrimination through ground, flight, and space demonstrations.

Develops and tests high-precision advanced sensors that improve, identify, acquire, track, and discriminate incoming threats, specifically addressing U.S. Strategic Command's Prioritized Capabilities List requirements. DSDD activities and software maturation enhances the BMDS capability to discriminate lethal objects in a threat cluster, and track and hand over the threat object with Aegis Launch on Remote and Engage on Remote precision. The increased kinematics envelope of the SM-3 Block IIA, when combined with Engage on Remote capability, will expand battlespace and increase the number of threats engaged.

Development of next-generation advanced sensor systems to include tracking lasers, specialized detectors, unique processors and the corollary ground, airborne and space subsystems. These advanced sensors operate at strategic ranges required to augment BMDS radar, improve BMDS discrimination capability and provide precision track of large raids. They also promise to track multiple targets simultaneously, substantially reducing the number of sensor assets required for large raids. The program will leverage the technology demonstrated from the ground and in the air to develop compact ruggedized advanced sensor technology. These include cost-effective focal plane arrays and advanced sensor components to inform future BMDS layer decisions for persistent tracking and discrimination.

Promising advanced sensor technology is tested at the Mount Wilson Aerospace Facility for Integrated Optical Test (MAFIOT) in conjunction with BMDS tests. This system provides line of sight viewing of missile launches from Vandenberg AFB and San Nicolas Island. The Massachusetts Institute of Technology / Lincoln Laboratory (MIT/LL) will also conduct advanced sensor testing to assess system performance. Additionally, MDA uses a transportable ground test bed to test advanced sensors.

Provides sensor integration into an MDA configured airborne platform to test in operationally relevant environments and demonstrations. Airborne platforms equipped with an EO/IR sensor could provide the MDA a viable quick reaction capability to augment BMDS radar. MDA may explore options to partner with the Services and develop concepts for cost effective integration of sensor technology into limited fielding upgrade kits, which may inform follow-on development decisions. These kits could be installed on platforms deployed in theater to add missile defense capabilities on short notice.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

MDA will continue EO/IR capability of Multi-Spectral Targeting System -C airborne sensors for precision track Launch on Remote and discrimination.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
Title: Discrimination Sensor Demonstrator Development	71.111	78.608	132.187
Articles:	-	-	-
Description: This project develops an advanced sensor system (tracking laser, advanced detector, infrared sensor, and precision tracking and discrimination algorithms) for participation in BMDS tests under operationally relevant conditions and at operationally relevant ranges. The sensors upgrade will provide capability for tracking and discrimination of lethal objects. In addition it provides passive stereo tracking and discrimination algorithms for the same. The sensors provide capability for tracking and discrimination of missile representative objects. Specific and/or unique planned accomplishments to each FY are as follows: ***FY 2019 Plans:*** - Complete missile tracking tests with advanced sensor ground test beds at MAFIOT and the Pacific Missile Range Facility - Transition algorithms and models based on data from advanced sensor ground test beds to the flight system - Complete development of an advanced sensor system in addition to a laser, detector and unique advanced processor - Complete integration of flight qualified advanced sensor system components onto an airborne platform - Conduct first flight test of the advanced sensor platform - Exercise passive EO/IR sensors in MDA fight tests for EO/IR data gathering ***FY 2020 Plans:*** Continue airborne advanced sensor design maturation to incorporate advanced threat and discrimination -- Begin test design for active flight tests -- Begin ground test for next generation advanced sensor - Integrate FY 2019 ground test results into follow-on technology transfer for next generation advanced sensor - Develop Technology Design Review criteria for a compact ruggedized advanced sensor for future space application - Award compact ruggedized advanced sensor contract Continue passive EO/IR missile tracking tests and demonstrations to complete data gathering for model baselining . ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase in FY 2019 to FY 2020 provides for increased participation in EO/IR tests through aircraft lease and ground support costs for BMDS level tests and flight qualification efforts leading to advanced sensor flight tests.			
Accomplishments/Planned Programs Subtotals	71.111	78.608	132.187

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*	

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	17.683	13.017	14.208	-	14.208	14.904	15.142	16.262	16.574	Continuing	Continuing
• 0603178C: *Weapons Technology*	28.894	13.400	10.000	-	10.000	10.000	10.000	0.000	0.000	Continuing	Continuing
• 0603180C: *Advanced Research*	23.765	42.565	20.674	-	20.674	21.154	21.521	22.041	22.465	Continuing	Continuing
• 0603884C: *Ballistic Missile Defense Sensors*	290.289	385.375	283.487	-	283.487	296.098	263.681	276.092	351.607	Continuing	Continuing
• 0603890C: *BMD Enabling Programs*	533.993	620.831	571.507	-	571.507	603.672	541.667	574.553	553.969	Continuing	Continuing
• 0603896C: *Ballistic Missile Defense Command and Control, Battle Management & Communication*	449.985	507.817	564.206	-	564.206	534.988	502.581	525.742	535.636	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy for DSDD consists of a contract(s) to industry via the Advanced Technology Innovation BAA and competitive procurements and agreements with FFRDCs to develop and demonstrate an advanced sensor system in realistic test environments. MDA will leverage agency partner subject matter experts and use government model based assessments for Better Buying Power 3.0 philosophy acquisition decisions.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Discrimination Sensor Demonstrator Development - Advanced Sensor Flight Demonstrator	Various	General Atomics, MIT/LL, TBD : C, MA, TBD	4.209	29.470	Aug 2018	50.783	Jan 2019	51.447	Nov 2019	-		51.447	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Advanced Sensor Ground Test	MIPR	MIT LL, Aerospace : MA, CA	15.073	5.710	Oct 2017	5.400	Oct 2018	2.000	Nov 2019	-		2.000	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Advanced Sensor Performance Analysis Aegis Engage on Remote Hardware in the Loop (HWIL)	MIPR	MIT LL, Aviation and Missile Research, Development, Engineering Center (AMRDEC), and Combat Capabilities Development Command - Aviation and Missile Center (CCDC-AMC) : MA, AL	5.663	4.572	Nov 2017	5.400	Dec 2018	5.900	Dec 2019	-		5.900	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Compact Ruggedized Advanced Sensor	Various	MIT LL, Industry (TBD) : MA, TBD	0.000	0.000		0.000		12.715	Jan 2020	-		12.715	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - EO/IR Flight Tests	C/CPFF	General Atomics : CA	0.000	20.423	Sep 2018	0.000		44.100	Nov 2019	-		44.100	Continuing	Continuing	Continuing
		Subtotal	24.945	60.175		61.583		116.162		-		116.162	Continuing	Continuing	N/A

Remarks

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Discrimination Sensor Demonstrator Development - Advisory and Assistance Services	C/CPFF	Various : NM, AL	1.673	3.821	Oct 2017	2.930	Oct 2018	3.049	Nov 2019	-		3.049	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Civilian Salaries and Travel	Allot	MDA Multi : AL, NM	3.773	4.031	Oct 2017	8.699	Oct 2018	8.283	Oct 2019	-		8.283	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Engineering and Technical Services	MIPR	Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Combat Capabilities Development Command - Aviation and Missile Center (CCDC-AMC), Aerospace Aerospace : AL, CA	2.269	0.000		2.120	Dec 2018	0.844	Oct 2019	-		0.844	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Facility Support	MIPR	377th ABW : NM	0.311	0.000		0.000		0.470	Oct 2019	-		0.470	Continuing	Continuing	Continuing
Discrimination Sensor Demonstrator Development - Information Management and Technology	C/CPAF	Northrop Grumman, Jacobs Technology : CO	4.651	3.084	Feb 2018	3.276	Oct 2018	3.379	Oct 2019	-		3.379	Continuing	Continuing	Continuing
		Subtotal	12.677	10.936		17.025		16.025		-		16.025	Continuing	Continuing	N/A

Remarks

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MD99 / *Discrimination Sensor Demonstrator Development*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	37.622	71.111		78.608		132.187		-		132.187	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
Advanced Sensor System Ground Test	▲																											
Advanced Sensor Development and Demonstration Contract Award				▲																								
Passive Flight Test					✧	✧	✧	✧	✧	✧	✧	✧	✧	✧														
Advanced Sensor Development					✧	✧	✧	✧	✧	✧	✧	✧	✧	✧														
Passive Flight Test Contract Extension								△																				
Compact Ruggedized Advanced Sensor Contract Award										△																		
Passive Flight Software Maturation										△																		
Compact Ruggedized Advanced Sensor Development											✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧
Advanced Sensor Testing											✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧
Advanced Sensor Discrimination Contract Award																	△											
Advanced Sensor Discrimination Development																		✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧
Advanced Sensor Discrimination Test																				✧	✧	✧						

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD99 / *Discrimination Sensor Demonstrator Development*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Advanced Sensor System Ground Test	1	2018	1	2018
Advanced Sensor Development and Demonstration Contract Award	4	2018	4	2018
Passive Flight Test	1	2019	2	2021
Advanced Sensor Development	1	2019	2	2021
Passive Flight Test Contract Extension	4	2019	4	2019
Compact Ruggedized Advanced Sensor Contract Award	2	2020	2	2020
Passive Flight Software Maturation	2	2020	2	2020
Compact Ruggedized Advanced Sensor Development	3	2020	4	2024
Advanced Sensor Testing	3	2020	4	2024
Advanced Sensor Discrimination Contract Award	2	2022	2	2022
Advanced Sensor Discrimination Development	3	2022	4	2024
Advanced Sensor Discrimination Test	1	2023	3	2023

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MT99 / *Technology Maturation Initiatives Test*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MT99: *Technology Maturation Initiatives Test*	6.918	4.974	1.982	11.262	-	11.262	1.684	4.145	0.824	0.000	0.000	31.789
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Increase from FY 2019 to FY 2020 provides increased passive sensor participation test costs such as asset shipment, range support and Command, Control, Battle Management and Communications (C2BMC).

Costs associated with lease, maintenance and operation of the aircraft are included in budget project MD99.

A. Mission Description and Budget Item Justification

The TMI test project funds the management and execution of TMI system participation in BMDS level tests, hardware-in-the-loop testing, and performance analysis costs for flight test data. This includes test asset shipment to test ranges, labor, travel, range support, C2BMC test support specific to TMI.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
Title: Technology Maturation Initiatives Test	4.974	1.982	11.262
Articles:	-	-	-

Description: The TMI Test project tests the systems developed under the DEDD and DSDD projects under realistic conditions in conjunction with on-going BMDS testing and through dedicated live fire tests to inform continued testing, full development and limited fielding decisions. This effort also demonstrates potential sensors, systems, and architectures to integrate the BMDS for left through right of launch.

Specific and/or unique planned accomplishments to each FY are as follows:

FY 2019 Plans:
- Conduct system level hardware-in-the-loop testing in conjunction with Enterprise Sensor Laboratory and Experimental Laboratory for a BMDS level test
- Shipping, labor, travel, and range support for a BMDS level test

FY 2020 Plans:
- Conduct system level hardware-in-the-loop testing in conjunction with Enterprise Sensor Laboratory and Experimental Laboratory for BMDS level tests

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
- Shipping, labor, travel, and range support for BMDS level tests			
FY 2019 to FY 2020 Increase/Decrease Statement: Increase from FY 2019 to FY 2020 provides increased passive sensor participation test costs such as asset shipment, range support and C2BMC.			
Accomplishments/Planned Programs Subtotals	4.974	1.982	11.262

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	17.683	13.017	14.208	-	14.208	14.904	15.142	16.262	16.574	Continuing	Continuing
• 0603178C: *Weapons Technology*	28.894	13.400	10.000	-	10.000	10.000	10.000	0.000	0.000	Continuing	Continuing
• 0603180C: *Advanced Research*	23.765	42.565	20.674	-	20.674	21.154	21.521	22.041	22.465	Continuing	Continuing
• 0603884C: *Ballistic Missile Defense Sensors*	290.289	385.375	283.487	-	283.487	296.098	263.681	276.092	351.607	Continuing	Continuing
• 0603890C: *BMD Enabling Programs*	533.993	620.831	571.507	-	571.507	603.672	541.667	574.553	553.969	Continuing	Continuing
• 0603896C: *Ballistic Missile Defense Command and Control, Battle Management & Communication*	449.985	507.817	564.206	-	564.206	534.988	502.581	525.742	535.636	Continuing	Continuing
• 0603914C: *Ballistic Missile Defense Test*	406.806	515.897	395.924	-	395.924	417.946	335.481	451.723	405.136	Continuing	Continuing

Remarks

D. Acquisition Strategy

The MDA Integrated Master Test Plan establishes and documents the test requirements for the BMDS with the specific focus on collecting the data needed for the Verification, Validation, and Accreditation of the BMDS models and simulations. This paradigm uses critical factor analysis to drive test design, planning, and execution for accrediting models & simulations, which is used to validate and assess system performance. With this test approach, the MDA will establish confidence that the models and simulations used to evaluate the BMDS represent real world behavior, thereby enabling simulation-based performance assessment to verify system functionality.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		-		-		-		-	-	-	N/A

Remarks

N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		-		-		-		-	-	-	N/A

Remarks

N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Maturation Initiatives Test - Command Control Battle Management and Communications/Aegis	Various	Northrop Grumman, Lockheed Martin, Space and Naval Warfare Center, National Air and Space Intelligence Center, Naval Surface Warfare Center Dahlgren Division : CO, CA, OH, VA	3.279	1.295	Mar 2018	0.728	Jan 2019	6.262	Oct 2019	-		6.262	Continuing	Continuing	Continuing
Technology Maturation Initiatives Test - Range Facility Test Prep	MIPR	Pacific Missile Range Facility, Edwards AFB : HI, CA	0.274	0.155	Mar 2018	1.254	Jan 2019	0.600	Oct 2019	-		0.600	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Technology Maturation Initiatives Test - Reagan Test Site Prep	MIPR	Reagan Test Site : Kwajalein Atoll	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Technology Maturation Initiatives Test - Transportation Costs	MIPR	US Air Force : CA	3.365	3.524	Nov 2017	0.000		4.400	Oct 2019	-		4.400	Continuing	Continuing	Continuing
		Subtotal	6.918	4.974		1.982		11.262		-		11.262	Continuing	Continuing	N/A

Remarks

N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.918	4.974		1.982		11.262		-		11.262	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
FTM-45 (AEGIS 5.1, DT Intercept Flight Test)					▲																							
FTI-03 (OTA, OT Intercept Flight Test)					△																							
GT-228					▲																							
FTG-11 (OT) (GM, OT Intercept Flight Test)						△																						
FTM-31 E1 (AEGIS SBT, DT/OT Intercept Flight Test)								△																				
FEX-01 (OTHER, DT Tracking Exercise FT)									△																			
FTM-44 (AEGIS 5.1, DT Intercept Flight Test)										△																		
FTM-30 (AEGIS 5.1, DT/OT Intercept Flight Test)												△																
GM CTV-03+ (GM, DT Interceptor Only Flight Test)																	△											
FTM-38 (AEGIS 5.0, DT/OT Intercept Flight Test)																			△									
FTG-17 (GM, DT Intercept Flight Test)																					△							
FTG-19 (GM, DT/OT Intercept Flight Test)																												

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MT99 / *Technology Maturation Initiatives Test*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
FTM-45 (AEGIS 5.1, DT Intercept Flight Test)	1	2019	1	2019
FTI-03 (OTA, OT Intercept Flight Test)	1	2019	1	2019
GT-228	1	2019	1	2019
FTG-11 (OT) (GM, OT Intercept Flight Test)	2	2019	2	2019
FTM-31 E1 (AEGIS SBT, DT/OT Intercept Flight Test)	4	2019	4	2019
FEX-01 (OTHER, DT Tracking Exercise FT)	1	2020	1	2020
FTM-44 (AEGIS 5.1, DT Intercept Flight Test)	2	2020	2	2020
FTM-30 (AEGIS 5.1, DT/OT Intercept Flight Test)	4	2020	4	2020
GM CTV-03+ (GM, DT Interceptor Only Flight Test)	2	2022	2	2022
FTM-38 (AEGIS 5.0, DT/OT Intercept Flight Test)	4	2022	4	2022
FTG-17 (GM, DT Intercept Flight Test)	1	2023	1	2023
FTG-19 (GM, DT/OT Intercept Flight Test)	1	2025	1	2025

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MC98 / *Cyber Operations*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MC98: *Cyber Operations*	0.471	0.162	5.254	0.475	-	0.475	0.477	0.467	0.472	0.478	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Decrease from FY 2019 to FY 2020 reflects the enacted congressional adjustment in FY 2019 to support cyber threats.

A. Mission Description and Budget Item Justification

Cyber Operations sustains MDA DoD Risk Management Framework and Controls Validation Testing activities, analysis of validation results, risk assessments and reviews of proposed Program Manager/Information Assurance Manager Plans of Action and Milestones for all Technology Maturation Initiative mission systems. It maintains Certification and Accreditation data repository, capturing DoD Information Assurance Certification and Accreditation Program documentation (artifacts, validation results, and Information Assurance Risk Assessment results, and Designated Approving Authority accreditation decisions) and Plans of Action and Milestones on all MDA information systems.

This project monitors and tracks Cybersecurity mitigations detailed in Information Technology security Plans of Action and Milestones. Activities include preparation of Certification and Accreditation documentation and accreditation recommendations to MDA Senior Information Assurance Officer /Certification Authority and Designated Approving Authority. Independent Verification and Validation team actions ensure the availability, integrity, authentication, confidentiality and non-repudiation of MDA mission, test and administrative systems. Activities in the project are necessary to comply with the Federal Information Security Management Act.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
Title: Network / System Certification and Accreditation (C and A)	0.162	5.254	0.475
Articles:	-	-	-
Description: The Cyber Operations project sustains MDA DoD Risk Management Framework (RMF) certification and Controls Validation Testing activities for the TMI PE. - Conduct cyber security and information assurance engineering and architecture planning for TMI information technology systems - Plan and test the information assurance controls for BMDS TMI systems - Develop TMI DoD RMF certification and accreditation packages - Conduct controls validation testing for TMI mission systems and provide Plan of Action and Milestones to mitigate information assurance deficiencies - Conduct annual information assurance reviews on the TMI enclaves to assess compliance in implementing and maintaining Information Assurance controls			
Specific and/or unique planned accomplishments to each FY are as follows:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
FY 2019 Plans: - Development of an enhanced security footprint with a flexible virtual environment that will aid in the development of new technologies, concepts, and cyber solutions - Develop a virtual cloud infrastructure enabling access to data in a secure environment -- Brings the user to the data instead of sending the data to the user - Prototype a cyber test bed to blue/red team functionality assessments - Implement exemplar secure processor solution ***FY 2020 Plans:*** - Conduct cyber security and information assurance engineering and architecture planning for TMI information technology systems - Plan and test the information assurance controls for BMDS TMI systems - Develop TMI DoD RMF certification and accreditation packages - Conduct controls validation testing for TMI mission systems and provide Plan of Action and Milestones to mitigate information assurance deficiencies - Conduct annual information assurance reviews on the TMI enclaves to assess compliance in implementing and maintaining Information Assurance controls ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Decrease from FY 2019 to FY 2020 reflects the enacted congressional adjustment in FY 2019 to support cyber threats.			
Accomplishments/Planned Programs Subtotals	0.162	5.254	0.475

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	17.683	13.017	14.208	-	14.208	14.904	15.142	16.262	16.574	Continuing	Continuing
• 0603178C: *Weapons Technology*	28.894	13.400	10.000	-	10.000	10.000	10.000	0.000	0.000	Continuing	Continuing
• 0603180C: *Advanced Research*	23.765	42.565	20.674	-	20.674	21.154	21.521	22.041	22.465	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy for Cyber Operations, consists of using MDA civilian employees and the existing competitively awarded contractor support services.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Network / System Certification and Accreditation (C and A) - Cyber Development and Engineering	C/CPFF	Davidson Technologies, JHU, Raytheon : AL, MD, MA	0.000	0.000		5.000	Jan 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C and A) - Cybersecurity Management and Computer Network Defense	C/CPFF	TEAMS : AL, NM	0.000	0.000		0.094	Jan 2019	0.300	Oct 2019	-		0.300	0.000	0.394	0.000
Network / System Certification and Accreditation (C and A) - Network / System Certification and Accreditation (C and A) - Agency Operations – Civilian Salaries and Travel	Allot	Missile Defense Agency : NM	0.140	0.162	Oct 2017	0.160	Oct 2018	0.175	Oct 2019	-		0.175	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C and A) - Network / System Certification and Accreditation (C and A) - CDS Implementation	C/CPFF	Northrop Grumman : CO	0.331	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	0.471	0.162		5.254		0.475		-		0.475	Continuing	Continuing	N/A

Remarks

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*	

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.471	0.162		5.254		0.475		-		0.475	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*

Significant Event Complete ▲ Significant Event Planned △ | Milestone Decision Complete ★ Milestone Decision Planned ☆ | Element Test Complete ◆ Element Test Planned ◇ | System Level Test Complete ● System Level Test Planned ○ | Complete Activity ✦ Planned Activity ✧

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
Cyber Security Support	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧
Cybersecurity Contract Award - 2					△																							
Cybersecurity Contract Award - 1					△																							
Cybersecurity Contract Award - 3						△																						
Controls Validation Certification 1							△																					
Controls Validation Certification 2																		△										

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MC98 / *Cyber Operations*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Cyber Security Support	1	2018	4	2024
Cybersecurity Contract Award - 2	1	2019	1	2019
Cybersecurity Contract Award - 1	1	2019	1	2019
Cybersecurity Contract Award - 3	2	2019	2	2019
Controls Validation Certification 1	3	2019	3	2019
Controls Validation Certification 2	3	2022	3	2022

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency			Date: March 2019
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604115C / *Technology Maturation Initiatives*	Project (Number/Name) MD40 / *Program Wide Support*	

COST ($ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MD40: *Program Wide Support*	8.667	6.521	6.661	9.268	-	9.268	6.712	6.715	8.596	8.974	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Wide Support (PWS) is allocated on a pro-rata basis across multiple Agency PE's each fiscal year based on the total Agency budget, and therefore fluctuates per PE by fiscal year.

A. Mission Description and Budget Item Justification

PWS contains non-headquarters management costs in support of MDA functions and activities across the entire BMDS. It Includes Government Civilians and Contract Support Services. This provides integrity and oversight of the BMDS 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. 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; data and unified communications support; supplies and maintenance; materiel and readiness and central property management of equipment; Facilities Sustainment, Restoration and Modernization (SRM) 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.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
Title: Program Wide Support	6.521	6.661	9.268
Articles:	-	-	-
Description: PWS contains non-headquarters management costs in support of MDA functions and activities across the entire BMDS. It Includes Government Civilians and Contract Support Services. This provides integrity and oversight of the BMDS 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. 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; data and unified communications support; supplies and maintenance; materiel and readiness and central property management of equipment; Facilities Sustainment, Restoration and Modernization (SRM) 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.			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD40 / *Program Wide Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020
FY 2019 Plans: - SEE ABOVE. ***FY 2020 Plans:*** - SEE ABOVE. ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Increase from FY 2019 to FY 2020 reflects the PWS allocation on a pro-rata basis across multiple Agency PE's each fiscal year based on the total Agency budget, and therefore fluctuates per PE by fiscal year.			
Accomplishments/Planned Programs Subtotals	6.521	6.661	9.268

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD40 / *Program Wide Support*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Wide Support - Agency Facilities and Maintenance (MIPR)	MIPR	Various : Multi: AL, VA	0.000	0.000		0.000		9.129	Nov 2019	-		9.129	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations Management	Allot	Various : Multi: AL, VA	0.091	0.033	Jul 2018	0.101	Jul 2019	0.139	Jul 2020	-		0.139	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Services	C/CPFF	Various : Multi: AL, VA	8.576	6.488	Aug 2018	6.560	Jun 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Services (MIPRS)	MIPR	Various : Multi: AK/ AL/CO/CA/HI/MD/ VA/NJ/NY/OCONUS	0.000	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	8.667	6.521		6.661		9.268		-		9.268	Continuing	Continuing	N/A

Remarks

N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	8.667	6.521		6.661		9.268		-		9.268	Continuing	Continuing	N/A

Remarks

Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD40 / *Program Wide Support*

Significant Event Complete ▲ | Milestone Decision Complete ★ | Element Test Complete ◆ | System Level Test Complete ● | Complete Activity ✦
Significant Event Planned △ | Milestone Decision Planned ☆ | Element Test Planned ◇ | System Level Test Planned ○ | Planned Activity ✧

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
MD40 Program-Wide Support	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Missile Defense Agency		Date: March 2019
Appropriation/Budget Activity 0400 / 4	**R-1 Program Element (Number/Name)** PE 0604115C / *Technology Maturation Initiatives*	**Project (Number/Name)** MD40 / *Program Wide Support*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
MD40 Program-Wide Support	1	2018	4	2024