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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604894C I <i>Multi Object Kill Vehicle</i>
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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	6.347	5.754	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.101
MD85: <i>Multi Object Kill Vehicle</i>	6.347	5.384	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.731
MD40: <i>Program-Wide Support</i>	-	0.370	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.370

Program MDAP/MAIS Code: 362

Note
Decrease in MOKV funding reflects realignment to other Department of Defense priorities.

A. Mission Description and Budget Item Justification

The MOKV program will enhance the Missile Defense System (MDS) Homeland Defense Interceptor performance to enable the Warfighter to counter more numerous and complex threats to the Homeland by enabling engagement of multiple objects from a single interceptor. The Missile Defense Agency (MDA) is developing the concepts for a MOKV based on a modular, open systems architecture designed to common interfaces and standards, making upgrades easier and broadening MDA's vendor and supplier base.

The MOKV will rely on a MDS architecture that balances performance across the Sensors, Command, Control, Battle Management and Communications (C2BMC), and GMD elements. Analyses show that having multiple kill vehicles on each interceptor can dramatically improve the performance of the system, significantly reduce the burden on interceptor inventory, and reduce cost to defend the Homeland.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	6.500	0.000	0.000	-	0.000
Current President's Budget	5.754	0.000	0.000	-	0.000
Total Adjustments	-0.746	0.000	0.000	-	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.146	0.000			
• Missile Defeat and Defense Enhancement	0.000	0.000	0.000	-	0.000
• Other Adjustment	-0.600	0.000	0.000	-	0.000

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Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide / BA 4:</i> <i>Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>
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Change Summary Explanation

Decrease in MOKV funding reflects realignment to other Department of Defense priorities.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency										Date: February 2020		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>				Project (Number/Name) MD85 / <i>Multi Object Kill Vehicle</i>			
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
MD85: <i>Multi Object Kill Vehicle</i>	6.347	5.384	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.731
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

MOKV funding realigned in PB20 to other Department of Defense priorities.

A. Mission Description and Budget Item Justification

MDA has implemented a structured, disciplined systems engineering process to assure the MOKV is a MDS solution. The systems engineering effort will define the requirements for a deployable MOKV. The Government will develop MOKV system engineering guidelines from industry concepts, government analysis, modeling, and simulation. Results from MOKV concept development and follow on technology risk reduction efforts will inform the Top Level Requirements development needed in order to execute a feasible, affordable future MOKV Product Development. MDA anticipates deploying this capability in the next decade to address the evolving threat.

As part of MOKV concept development, industry identified technology component risk reduction efforts that support their concepts. MOKV technology risk reduction efforts include maturation of engagement management algorithms, communications, seekers, advanced sensors, Divert and Attitude Control Systems propulsion, integrated avionics, and Guidance, Navigation and Control technology.

The GMD element of the MDS provides combatant commanders with a continuously available (24 hours a day, 365 days a year) capability to defend the United States Homeland against Intercontinental Ballistic Missile attacks. In order to address the evolving and expanding threat of ballistic missile attacks on the Homeland, MDA is developing a more capable ground-based interceptor with a MOKV that will be able to defeat complex future threats.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2019	FY 2020	FY 2021
Title: Multi Object Kill Vehicle	5.384	0.000	0.000
Articles:	-	-	-
Description: In order to address the evolving and expanding threat of ballistic missile attacks on the Homeland, MDA is developing a more capable ground-based interceptor with a MOKV that will be able to defeat complex future threats.			
The MOKV replaces a unitary kill vehicle (KV) on current GBIs with a payload containing multiple, smaller kill vehicles (KVs). The MOKV concept also allows for a potentially substantial reduction of the GBI inventory required to protect the homeland, as multiple GBIs with a unitary KV will no longer be required to address a target complex with multiple threats.			
Specific and/or unique accomplishments to each FY are as follows:			
FY 2020 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD85 / <i>Multi Object Kill Vehicle</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
N/A			
<i>FY 2021 Plans:</i> N/A			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> N/A			
Accomplishments/Planned Programs Subtotals	5.384	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0603294C: <i>Common Kill Vehicle Technology</i>	55.549	13.600	11.058	-	11.058	10.996	11.052	11.290	11.563	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy for Technology Risk Reduction consists of three focus areas. First, through competition with missile integration contractors, develop kill vehicle architectures and interfaces with competitive design of MOKV concepts incorporating engagement management concept of operations, kill vehicles and enhanced discrimination capability. Second, conduct risk reduction activities to identify and mature the technology necessary to increase the reliability and performance of our kill vehicles using the Advanced Technology Innovation Broad Agency Announcement (BAA) and competitive procurements. Make investments that mitigate the component development gaps for future MOKV, and enhance the competitive environment. Make the necessary investments to maturing component technology; enhanced inertial navigation and kill vehicle-to-kill vehicle communications. Third, leverage the technical expertise of Federally Funded Research and Development Centers (FFRDCs), University Applied Research Centers (UARCs), and Universities and government laboratories to independently develop reference concept using proven modeling/analysis techniques.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD85 / <i>Multi Object Kill Vehicle</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Multi Object Kill Vehicle - MOKV Technology Development	C/CPFF	Various : Various	0.444	0.000		0.000		0.000		-		0.000	0.000	0.444	0.000
Subtotal			0.444	0.000		0.000		0.000		-		0.000	0.000	0.444	N/A

Remarks

N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Multi Object Kill Vehicle - Contract Support Services	C/CPFF	Various : AL/AK/CA/CO/VA	1.211	2.519	Nov 2018	0.000		0.000		-		0.000	0.000	3.730	0.000
Multi Object Kill Vehicle - FFRDC Support Services	MIPR	Various : Various	1.427	1.011	Nov 2018	0.000		0.000		-		0.000	0.000	2.438	0.000
Multi Object Kill Vehicle - MOKV Development	C/CPFF	Various : AL/AK/CA/CO/VA	0.000	0.236	Nov 2018	0.000		0.000		-		0.000	0.000	0.236	0.000
Multi Object Kill Vehicle - Other Government Agencies	MIPR	Various : Various	3.265	1.618	Nov 2018	0.000		0.000		-		0.000	0.000	4.883	0.000
Subtotal			5.903	5.384		0.000		0.000		-		0.000	0.000	11.287	N/A

Remarks

N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	-		-		-		-		-	-	-	N/A

Remarks

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD85 / <i>Multi Object Kill Vehicle</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.347	5.384	0.000	0.000	-	0.000	0.000	11.731	N/A

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

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD85 / <i>Multi Object Kill Vehicle</i>
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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 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
MOKV Development Acquisition Strategy					◆◆◆◆						

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD85 / <i>Multi Object Kill Vehicle</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MOKV Development Acquisition Strategy	1	2019	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency										Date: February 2020		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>				Project (Number/Name) MD40 / <i>Program-Wide Support</i>			
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: <i>Program-Wide Support</i>	-	0.370	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.370
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY 2020 reflects proportional PWS changes as a result of the consolidation of the CKV Technology program element 0603294 with this program element 0604894C.

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.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2019	FY 2020	FY 2021
Title: Program Wide Support	0.370	0.000	0.000
Articles:	-	-	-
Description: 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			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency	Date: February 2020
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Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD40 / <i>Program-Wide Support</i>
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
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. <i>FY 2020 Plans:</i> - SEE ABOVE. <i>FY 2021 Plans:</i> - SEE ABOVE. <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> N/A			
Accomplishments/Planned Programs Subtotals	0.370	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD40 / <i>Program-Wide Support</i>
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Wide Support - Agency Operations Management	Allot	Various : Multi: AL, CA, CO, VA	0.000	0.370	Jul 2019	0.000		0.000		-		0.000	0.000	0.370	0.000
Subtotal			0.000	0.370		0.000		0.000		-		0.000	0.000	0.370	N/A

Remarks
N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.370	0.000	0.000	-	0.000	0.000	0.370	N/A

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

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD40 / <i>Program-Wide Support</i>
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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 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
MD40 Program-Wide Support					◇◇◇◇						

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604894C / <i>Multi Object Kill Vehicle</i>	Project (Number/Name) MD40 / <i>Program-Wide Support</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MD40 Program-Wide Support	1	2019	4	2019