

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>
--	---

COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	111.506	52.825	15.886	0.000	15.886	-	-	-	-	-	-
645341: <i>Direct Strike Penetrator Systems</i>	0.000	111.506	52.825	15.886	0.000	15.886	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Direct Strike Penetrator Systems program develops and modifies a family of advanced precision-guided penetrator munitions to include evaluation of integrated technologies for the development/integration of advanced position, navigation, and timing (PNT) capabilities (i.e., Global Positioning System (GPS), non-GPS, optical, passive, active, etc.) and smart fuze systems, and all penetrator components, that will provide the Air Force with improved ability to attack Hard and Deeply Buried Targets (HDBT), such as bunker and tunnel facilities, using air-to-surface conventional munitions. Systems developed include, but are not limited to Massive Ordnance Penetrator (MOP), GBU-72 Advanced 5,000-lb Penetrator Weapon System (A5K), and Section 804 Rapid Prototype/Rapid Fielding activities. Systems developed will be integrated onto current and future platforms to reduce the number of weapons required to hold HDBTs at risk and will result in more targets engaged per mission flown. Direct Strike Penetrators will provide critical global strike capability not met by inventory conventional weapons and will hold at risk the best protected high value assets essential to an enemy's war fighting ability. The project also provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes.

A Hard Target Munitions (HTM) Analysis-of-Alternatives (AoA) was conducted in 2014 to determine the best weapons and/or development efforts for addressing the HDBT mission area. The HTM AoA determined that it was necessary to develop a family of HTMs in order to apply effects to the entire range of HDBT sets. The Air Force is using the AoA to develop, produce and modify HDBT weapons identified as the most effective and affordable. Modeling and simulation is used to assess and characterize current inventory and, to drive design and explore the utility of new classes of penetrator munitions.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Hard and Deeply Buried Targets Defense System for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$1.468M is forecasted for civilian pay expenses in this program element.

The FY2022 funding was request was reduced by \$0.848M to account for the availability of prior year execution balances.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force				Date: May 2021		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 Program Element (Number/Name) PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program				
B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	
Previous President's Budget	113.121	52.921	16.974	0.000	16.974	
Current President's Budget	111.506	52.825	15.886	0.000	15.886	
Total Adjustments	-1.615	-0.096	-1.088	0.000	-1.088	
• Congressional General Reductions	0.000	-0.096				
• 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	-1.615	0.000				
• Other Adjustments	0.000	0.000	-1.088	0.000	-1.088	
Change Summary Explanation No Significant Changes						
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2020	FY 2021	FY 2022
Title: Massive Ordnance Penetrator (MOP) Modification				67.903	45.306	15.886
Description: Modify the Massive Ordnance Penetrator (MOP) weapon for enhanced capability to hold additional Hard and Deeply Buried Targets at risk in multiple Combatant Commands (COCOMs). The modification will be primarily software-based and the existing inventory of Guided Bomb Unit (GBU)-57E/B will be retrofitted. Construct relevant hard and deeply buried targets for testing. Execute MOP testing in support of modification efforts to included sub-scale and full-scale ground and flight tests. Analyze MOP weapon effectiveness.						
FY 2021 Plans: Continue testing and evaluating integration of MOP Modification for enhanced capability. Build long-lead targets and accomplish flight tests for expanded aircraft employment.						
FY 2022 Plans: Complete long-lead target build and test & evaluation of MOP Modification for enhanced capability.						
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to MOP Modification EMD efforts ramping down.						
Title: Advanced 5,000 lb (A5K) Penetrator				43.603	5.369	0.000

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
--	-----------------------

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program
---	--

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: GBU-72 Advanced 5,000 lb (A5K) Penetrator is an improved 5,000 lb class penetrator to address capability gaps identified in the HTM AoA. Conduct A5K design, development, integration, modeling and simulation, and testing to improve performance against increasingly hardened targets. This effort utilizes existing and improved technologies to field an integrated penetrator weapon system to include: an improved penetrator warhead, a smart fuze system that can detect layers/voids, and a modified Joint Direct Attack Munition (JDAM) tail kit for all weather, precision guidance, navigation, and control.</p> <p>FY 2021 Plans: Complete JDAM integration and DT/OT flight tests to support fielding recommendation.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to realignment of funds to A5K for Smart Fuzing Effort.</p>			
<p>Title: Military Code (M-Code) and Enhanced Anti-Jam (EAJ)</p> <p>Description: M-Code and EAJ provides the capability to operate in increasing adversarial anti-access/area denial (A2/AD) jamming environments. M-Code and EAJ also provide increased accuracy, better signal acquisition, and advanced security.</p> <p>FY 2021 Plans: Developing M-Code integration into MOP weapon system.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to M-Code transitioning from development to integration in the MOP weapon system.</p>	0.000	2.150	0.000
Accomplishments/Planned Programs Subtotals	111.506	52.825	15.886

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• PAAF 01 353190: Massive Ordnance Penetrator (MOP)	-	-	15.500	-	15.500	-	-	-	-	-	-
• PAAF 01 353020: General Purpose Bombs	621.732	369.566	176.565	-	176.565	-	-	-	-	-	-

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
--	-----------------------

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604327F I <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>
--	---

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

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 0604602F: <i>Armament/ Ordnance Development</i>	29.505	23.034	9.047	-	9.047	-	-	-	-	-	-
• RDTE 05 0604618F: <i>Joint Direct Attack Munition</i>	-	6.806	-	-	-	-	-	-	-	-	-
• RDTE 04 0604201F: <i>PNT Resiliency</i>	120.267	-	39.742	-	39.742	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

MOP uses sole source cost type contracts to complete development, test, and evaluation activities.

M-Code/EAJ effort uses a Family of Systems approach where the three prime weapons contractors develop receivers capable of operating in any of their AF weapons. The receivers are based on a common, internally-developed interface requirements specification, technology requirement document, and threat scenario. This approach uses a combination of contract types based on acquisition phase (Technology Maturation and Risk Reduction, Development, Production) and risk. The Weapons System Program Offices share a common development program element to allow flexibility in funding and planning, switching to individual PEs for receiver integration, operational test, and production. The M-Code/EAJ Weapons Receiver Development effort leverages technology currently under development by the GPS-Directorate Military GPS User Equipment program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.

The initial GBU-72/A5K design was accomplished through modeling, simulation, and analysis producing potential designs. The designs were developed based on the performance parameters of survivability, lethality, accuracy and penetration. The Government determined the optimum A5K design to manufacture production representative prototypes to include warheads, fuzes and modified JDAM kits. These assets will be used to conduct and successfully complete qualification testing and integration.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	Project (Number/Name) 645341 / <i>Direct Strike Penetrator Systems</i>
--	---	--

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
MOP Modification and Integration	SS/ Various	Boeing : St Louis, MO	0.000	9.159	Feb 2020	7.893	Feb 2021	6.171	Nov 2021	-		6.171	-	-	-
M-Code/EAJ Receiver	SS/CPAF	Various : TBD	0.000	-		2.150	Jun 2021	-		-		-	-	-	-
A5K Warhead Design/ Components & Cases	MIPR	DOTC/ARA : Albuquerque, NM	0.000	2.480	Oct 2019	-		-		-		-	-	-	-
A5K Guidance (JDAM)	SS/ Various	Boeing : St Louis, MO	0.000	7.863	Dec 2019	-		-		-		-	-	-	-
A5K Embedded Fuze	MIPR	DOTC/ARA/NGIS : Albuquerque, NM	0.000	9.409	Oct 2019	-		-		-		-	-	-	-
Subtotal			0.000	28.911		10.043		6.171		-		6.171	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
MOP Govt Support	Various	Various : Eglin AFB, FL	0.000	1.836	Feb 2020	0.125	Feb 2021	2.672	Nov 2021	-		2.672	-	-	-
A5K System T&E Contractor Support	MIPR	DOTC/ARA/NGIS : Albuquerque, NM	0.000	7.885	Oct 2019	-		-		-		-	-	-	-
A5K System T&E Government Support	MIPR	MCAAP : McAlester, OK	0.000	3.078	May 2020	-		-		-		-	-	-	-
Subtotal			0.000	12.799		0.125		2.672		-		2.672	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
MOP Test & Evaluation	Various	AFLCMC : Eglin, Holloman, Edw, FL	0.000	23.095	Jan 2020	1.075	Feb 2021	6.203	Nov 2021	-		6.203	-	-	-
MOP Target Construction and Instrumentation	Various	DTRA : Albuquerque, NM	0.000	33.164	Nov 2019	33.527		-		-		-	-	-	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	Project (Number/Name) 645341 / <i>Direct Strike Penetrator Systems</i>
--	---	--

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
A5K Developmental Test & Evaluation	Various	96 TW, 780 TS : Eglin, Holloman, FL	0.000	2.579	Apr 2020	-		-		-		-	-	-	-
A5K Operational Test & Evaluation	Various	96 TW, Det 1, DTRA : Eglin, WSMR, FL	0.000	8.909	Oct 2019	5.354	Jul 2021	-		-		-	-	-	-
Subtotal			0.000	67.747		39.956		6.203		-		6.203	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
MOP Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	0.000	0.649	May 2020	2.686	Oct 2020	0.840	Nov 2021	-		0.840	-	-	-
A5K Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	0.000	1.400	Jan 2020	0.015		-		-		-	-	-	-
Subtotal			0.000	2.049		2.701		0.840		-		0.840	-	-	N/A

Remarks
MOP PMA decreased in FY 2022 due to EMD efforts ramping down.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	111.506	52.825	15.886	-	15.886	-	-	N/A

Remarks

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	Project (Number/Name) 645341 / <i>Direct Strike Penetrator Systems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Direct Strike Penetrator Systems</i>				
MOP Modification Analysis and Testing	1	2020	3	2023
A5K Design, Development and Testing	1	2020	4	2021
M-Code/EAJ Development/Integration	1	2021	4	2021

Note
Fielding M-code integration will be funded through the Weapons SPOs individual PEs.