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Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Air Force									Date: May 2017			
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							
COST (\$ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	440.671	62.034	74.308	17.365	0.000	17.365	72.039	4.152	0.000	0.000	0.000	670.569
645341: Direct Strike Penetrator Systems	440.671	62.034	74.308	17.365	0.000	17.365	72.039	4.152	0.000	0.000	0.000	670.569
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Program MDAP/MAIS Code: 475												
Note In FY 2018, PE 0604602F, Armament/Ordnance Development, Project 653134, BLU-109 and BLU-113 Upgrade efforts were transferred to PE 0604327F, Hard and Deeply Buried Target Defeat System (HDBTDS) Program, Project 645341, Direct Strike Penetrator Systems, in order to consolidate hard target munitions in one program element.												
A. Mission Description and Budget Item Justification The Direct Strike Penetrator Systems develops advanced precision guided penetrator munitions to include development/integration of advanced precision, navigation, and timing (PNT) capabilities (i.e., GPS, non-GPS, optical, passive, active, etc.) that will provide the Air Force with improved ability to attack Hard & Deeply Buried Targets (HDBT), such as bunker and tunnel facilities, using air-to-surface conventional munitions. Systems developed will hold HDBTs at risk using fewer weapons, reducing the number of missions necessary to defeat targets, and resulting in an increase to mission survivability. Direct Strike Penetrators will provide critical global strike capability not met by inventory conventional weapons. It will hold at risk the best defended and protected high value assets essential to an enemy's warfighting ability. A Hard Target Munitions (HTM) Analysis-of-Alternatives (AoA) was conducted to determine the best weapons and/or development efforts for addressing the HDBT mission area. The HTM AoA determined it was necessary to develop a family of HTMs in order to apply effects to the entire range of HDBTs set. The Air Force is using the AoA to start development, production, and modification activities for HDBT attack weapons identified in it as most effective and affordable. Major thrust areas include: - Massive Ordnance Penetrator (MOP) is a 30,000 lb class precision guided penetrator designed to defeat hard and deeply buried targets. - Advanced 5000-pound Penetrator (A5K) will develop an improved 5000-pound class penetrator to address capability gaps identified in the HTM AoA. Funding for the A5K penetrator development effort falls under Direct Strike Penetrator Systems beginning FY18. - M-Code and Enhanced Anti-Jam (EAJ) develop and integrate advanced PNT capabilities to allow operations in anti-access/area denial (A2/AD) environments. M-Code and EAJ also provide increased accuracy, better signal acquisition, and advanced security.												

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Budget Activity 4, Advanced Component Development and Prototypes (ACD&P) because efforts are necessary to evaluate integrated technologies, representative modes, and prototype systems in a high fidelity and realistic operating environment.								
B. Program Change Summary (\$ in Millions)		FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total		
Previous President's Budget		54.637	74.308	32.287	0.000	32.287		
Current President's Budget		62.034	74.308	17.365	0.000	17.365		
Total Adjustments		7.397	0.000	-14.922	0.000	-14.922		
• 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		8.403	0.000					
• SBIR/STTR Transfer		-1.006	0.000					
• Other Adjustments		0.000	0.000	-14.922	0.000	-14.922		
Change Summary Explanation								
FY2018: +\$17.365M, transfer of BLU-113 Upgrade funds (\$0.645M) from PE 0604602F and added funds (\$16.720M) to continue development of the Advanced 5000lb (A5K) Penetrator								
FY2018: -\$32.287M, transfer to PE 0604201F for M-Code Development								
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: Massive Ordnance Penetrator (MOP) Weapon Development, Target Construction, Testing and Analysis.				62.034	14.900	0.000	0.000	0.000
Description: Design, develop, and test the baseline and Enhanced Threat Response (ETR) MOP Weapon and integrate it on the B-2. Construct relevant hard and deeply buried targets for testing. Execute MOP testing in support of development efforts. Analyze MOP weapon effectiveness.								
FY 2016 Accomplishments:								
Continued development of the third and fourth phases (ETR III & IV) for the current MOP weapon, including development of an acquisition strategy for incorporation of M-code. Constructed several hard and deeply buried targets for live weapon testing for both ETR III & IV weapon modification. Conducted several live weapon tests								

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
to validate the ETR III modifications. Analyzed weapons effects and developed methods to optimize the MOP weapon's effectiveness. FY 2017 Plans: Completed development of the ETR IV capability for the MOP weapon, including incorporation of a M-Code GPS Receiver. Conducted live weapon tests to validate the ETR IV modifications. Analyzed weapons effects and develop methods to optimize the MOP weapon's effectiveness. FY 2018 Base Plans: N/A FY 2018 OCO Plans: N/A						
Title: Advanced 5000 lb (A5K) Penetrator Programs Description: Conduct A5K design, development, integration, and testing to improve performance against increasingly hardened targets. This effort will utilize 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 JDAM tail kit for all weather, precision guidance, navigation, and control. FY 2016 Accomplishments: N/A FY 2017 Plans: N/A FY 2018 Base Plans: Warhead development, to include smart fuzing, will utilize simulation based design to start the design process. Trade studies and technical reviews will be accomplished to ensure that the A5K system meets the attributes identified in the HTM AoA. Integration with the JDAM tailkit will commence with the strake design and initial autopilot development. FY 2018 OCO Plans: N/A		0.000	0.000	17.365	0.000	17.365
Title: M-Code/EAJ		0.000	59.408	0.000	0.000	0.000

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C. Accomplishments/Planned Programs (\$ in Millions)											
					FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total		
Description: M-Code and EAJ provides the capability to operate in increasing adversarial A2/AD jamming environments. M-Code and EAJ also provide increased accuracy, better signal acquisition, and advanced security. FY 2016 Accomplishments: N/A FY 2017 Plans: Began development of M-Code with Enhanced Anti-Jam (EAJ) receiver for implementation into weapon systems. FY 2018 Base Plans: N/A FY 2018 OCO Plans: N/A											
Accomplishments/Planned Programs Subtotals					62.034	74.308	17.365	0.000	17.365		
D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• PAAF: BA01: Line Item #353190: WRM-Ammunition (MOP)	39.690	3.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	39.690
• RDTE: BA05: PE 0604602F: Armament/Ordnance Development	13.396	4.496	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	17.892
• RDTE: BA04: PE 0604201F: Integrated Avionics Planning & Development	0.000	0.000	60.444	0.000	60.444	15.006	0.000	0.000	0.000	0.00	63.956
Remarks											
E. Acquisition Strategy											
MOP is a sole source, cost plus fixed fee contract.											
The M-Code/EAJ effort will have multiple contract awards.											

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<p>A5K will have multiple contract awards.</p> <p><u>F. Performance Metrics</u></p> <p>Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Air Force												Date: May 2017			
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 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MOP Weapon Development	SS/CPIF	Boeing : St Louis, MO	248.739	15.123	Feb 2017	7.432	Mar 2017	0.000		0.000		0.000	0.000	271.294	195.772
M-Code/EAJ Receiver Development/Integration	SS/TBD	Boeing : St Louis, MO	0.000	0.000		53.467	Feb 2017	0.000		0.000		0.000	32.449	85.916	85.916
MOP Hard Target Munitions (HTM) Capabilities Analysis	Various	Whitney, Bradley & Brown; ARA; Booz Allen : Eglin, FL	1.436	0.288		0.000		0.000		0.000		0.000	0.000	1.724	1.724
MOP HTM Concept/Technology Study	Various	Several Local Companies : Eglin, FL	3.244	0.000		0.000		0.000		0.000		0.000	0.000	3.244	3.244
MOP HTM Weapons Effects/Target Analysis	RO	Defense Threat Reduction Agency : Albuquerque, NM	5.308	0.005		0.000		0.000		0.000		0.000	0.000	5.313	5.313
MOP HTM Concept Tech Data	Various	Several Local Companies : Eglin AFB, FL	0.000	0.000		0.000		0.000		0.000		0.000	0.000	0.000	0.000
MOP HTM Technical Support	Various	Jacobs Engr. : Eglin, FL	2.769	0.000		0.000		0.000		0.000		0.000	0.000	2.769	2.769
A5K Development	Various	SAIC : Herndon, VA	0.000	0.000		0.000		9.377	Oct 2017	0.000		9.377	23.621	32.998	32.998
Subtotal			261.496	15.416		60.899		9.377		0.000		9.377	56.070	403.258	327.736
Support (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MOP Govt Support	Various	Several Govt Labs and test Centers : Eglin AFB, FL	14.028	3.513	Jan 2016	0.664	Oct 2016	0.000		0.000		0.000	0.000	18.205	13.199
Subtotal			14.028	3.513		0.664		0.000		0.000		0.000	0.000	18.205	13.199

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Test and Evaluation (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MOP System Test & Evaluation	Various	AFLCMC : Eglin , Holloman, Edwards, FL	8.492	2.426	Jan 2016	1.820	Jun 2017	0.000		0.000		0.000	0.000	12.738	6.369
MOP Flight Test Range Support	Various	White Sands Missile Range : White Sands Missile Range, NM	5.646	0.783	Jan 2016	0.524	Jun 2017	0.000		0.000		0.000	0.000	6.953	13.644
MOP Target Construction and Instrumentation	Various	Defense Threat Reduction Agency : Albuquerque, NM	127.469	33.157	Jan 2016	6.178	Jun 2017	0.000		0.000		0.000	0.000	166.804	81.527
MOP Test and Evaluation Activities	Various	AF Flight Test Center : Albuquerque, NM	12.368	4.823		0.420	Jun 2017	0.000		0.000		0.000	0.000	17.611	13.123
A5K Test and Evaluation Activities	Various	96 TW : Eglin, FL	0.000	0.000		0.000		7.120	Aug 2018	0.000		7.120	17.934	25.054	-
M-Code/EAJ Test and Evaluation Activities	Various	AFLCMC : Eglin, Holloman, Edwards, FL	0.000	0.000		1.035	Jun 2017	0.000		0.000		0.000	0.000	1.035	5.815
Subtotal			153.975	41.189		9.977		7.120		0.000		7.120	17.934	230.195	-
Management Services (\$ in Millions)				FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MOP Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	10.560	1.916	Jan 2016	0.968	Oct 2016	0.000		0.000		0.000	0.000	13.444	0.000
M-Code/EAJ Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	0.000	0.000		1.800	Oct 2016	0.000		0.000		0.000	0.000	1.800	0.000
A5K/A2K Program Management Administration (PMA)	Various	AFLCMC/XR : Eglin AFB, FL	0.612	0.000		0.000		0.868	Oct 2017	0.000		0.868	2.187	3.667	0.000
Subtotal			11.172	1.916		2.768		0.868		0.000		0.868	2.187	18.911	0.000

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		Prior Years	FY 2016		FY 2017		FY 2018 Base		FY 2018 OCO		FY 2018 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		440.671	62.034		74.308		17.365		0.000		17.365	76.191	670.569	-
Remarks														

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Exhibit R-4, RDT&E Schedule Profile: FY 2018 Air Force										Date: May 2017	
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	FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MOP ETR-III Modification Design and Qualification Testing																												
MOP ETR-IV Modification Design and Qualification Testing																												
MOP ETR-III Test Construction and Flight Testing																												
MOP ETR-IV Test Construction and Flight Testing																												
MOP Analysis																												
A5K Design, Development and Testing																												
M-Code/EAJ Development/Integration																												

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Exhibit R-4A, RDT&E Schedule Details: FY 2018 Air Force			Date: May 2017
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MOP ETR-III Modification Design and Qualification Testing	1	2016	1	2016
MOP ETR-IV Modification Design and Qualification Testing	1	2016	2	2017
MOP ETR-III Test Construction and Flight Testing	2	2016	3	2016
MOP ETR-IV Test Construction and Flight Testing	1	2017	2	2017
MOP Analysis	1	2016	2	2017
A5K Design, Development and Testing	1	2018	1	2021
M-Code/EAJ Development/Integration	1	2017	4	2021