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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Air Force										Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	497.723	52.706	17.365	71.501	0.000	71.501	4.121	0.000	0.000	0.000	0.000	643.416
645341: Direct Strike Penetrator Systems	497.723	52.706	17.365	71.501	0.000	71.501	4.121	0.000	0.000	0.000	0.000	643.416
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Program MDAP/MAIS Code: 475												
A. Mission Description and Budget Item Justification												
<p>The Direct Strike Penetrator Systems program develops and modifies advanced precision guided penetrator munitions to include development/integration of advanced positioning, 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 and Deeply Buried Targets (HDBT), such as bunker and tunnel facilities, using air-to-surface conventional munitions. Systems developed will hold additional HDBTs at risk, reduce the number of weapons to hold HDBTs at risk, resulting 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 defended/ protected high value assets essential to an enemy's war fighting ability.</p>												
<p>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 develop, produce and modify HDBT weapons identified as the most effective and affordable. Modeling and simulation is used to assess and characterize current inventory, drive design and explore the utility of new classes of penetrator munitions.</p>												
<p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver MOP, A2K, A5K, and M-Code weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.</p>												
<p>This program is in 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.</p>												

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3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)		PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program			
B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	74.308	17.365	72.039	0.000	72.039
Current President's Budget	52.706	17.365	71.501	0.000	71.501
Total Adjustments	-21.602	0.000	-0.538	0.000	-0.538
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	-19.600	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	-2.002	0.000			
• Other Adjustments	0.000	0.000	-0.538	0.000	-0.538
Change Summary Explanation					
FY2017: -\$19.600M, Congressional Adjustment for improved GPS					
C. Accomplishments/Planned Programs (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Massive Ordnance Penetrator (MOP)	15.328	0.000	0.000	0.000	0.000
Description: MOP is a 30,000 lb class precision guided penetrator designed to defeat hard and deeply buried targets. 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 2018 Plans: N/A					
FY 2019 Base Plans: N/A					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: N/A					
Title: Advanced 5000 lb (A5K) Penetrator	2.570	17.365	38.539	0.000	38.539

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: Advanced 5000 lb (A5K) Penetrator is an improved 5000 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 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.</p> <p>FY 2018 Plans: Warhead and smart fuzing development utilize a modeling and simulation based design process. Accomplish trade studies and technical reviews to ensure the A5K system addresses the capability gaps identified in the HTM AoA. Begin integration with the JDAM tailkit with the strake design and initial autopilot development.</p> <p>FY 2019 Base Plans: Continue A5K modeling and simulation, development, prototype production, integration, testing and qualification of the A5K weapons system to verify the system performance against the prioritized HTM AoA target set.</p> <p>FY 2019 OCO Plans: N/A</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding increased due to additional development and testing activities.</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 A2/AD jamming environments. M-Code and EAJ also provide increased accuracy, better signal acquisition, and advanced security.</p> <p>FY 2018 Plans: N/A</p> <p>FY 2019 Base Plans: Develop and integrate Military code (M-Code) across the AFPEO weapons portfolio.</p> <p>FY 2019 OCO Plans:</p>		34.808	0.000	32.962	0.000	32.962

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C. Accomplishments/Planned Programs (\$ in Millions)						FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	
N/A											
FY 2018 to FY 2019 Increase/Decrease Statement: Funding increase to provide support to M-Code enterprise.											
Accomplishments/Planned Programs Subtotals						52.706	17.365	71.501	0.000	71.501	
D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• PAAF 01 Line Item 353190: WRM-Ammunition (MOP)	3.600	38.382	38.111	-	38.111	0.000	0.000	0.000	-	Continuing	Continuing
• RDTE 05 PE 0604602F: Armament/Ordnance Development	4.496	-	0.000	-	0.000	0.000	0.000	0.000	-	0.000	4.496
• RDTE 04 PE 0604201F: Integrated Avionics Planning & Development	0.000	60.444	14.894	-	14.894	0.000	0.000	0.000	-	Continuing	Continuing
Remarks											
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.											
E. Acquisition Strategy											
MOP uses a sole source cost type contract to complete ETR 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 IRS, TRD, and threat scenario. This approach uses a combination of contract types based on acquisition phase (TMRR, Development, Production) and risk. The Weapons SPOs share a common development PE to allow flexibility in funding and planning, switching to individual PEs for receiver integration, OT, and production. The M-Code/EAJ Weapons Receiver Development effort leverages technology currently under development by the GPS-D MGUE program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.											
The initial A5K design will be accomplished through modeling, simulation, and analysis producing potential designs. The designs will be developed based on the performance parameters of survivability, lethality, accuracy and penetration. Upon completing the modeling, simulation, and analysis of the A5K prototype designs a government review will determine the optimum A5K design going forward. That design will be used to fabricate test articles to include warheads, fuzing, and modified JDAM tail kits. These assets will be used to conduct and successfully complete qualification testing.											

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F. Performance Metrics 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.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Air Force												Date: February 2018			
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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
M-Code/EAJ Receiver Development/Integration	Various	Various : TBD	0.000	25.208	Nov 2017	-		32.962	Dec 2019	-		32.962	Continuing	Continuing	-
MOP Weapon Development	SS/CPIF	Boeing : St Louis, MO	259.463	2.998	Aug 2017	-		-		-		-	0.000	262.461	264.463
MOP Hard Target Munitions (HTM) Capabilities Analysis	Various	Whitney, Bradley & Brown; ARA; Booz Allen : Eglin, FL	3.736	8.875	Sep 2017	-		-		-		-	0.000	12.611	12.611
MOP HTM Concept/Technology Study	Various	Several local companies : Eglin, FL	3.244	-		-		-		-		-	0.000	3.244	3.244
MOP HTM Weapons Effects/Target Analysis	RO	DTRA : Albuquerque, NM	5.308	-		-		-		-		-	0.000	5.308	5.308
MOP HTM Technical Support	Various	Jacobs Engineering : Eglin, FL	2.769	-		-		-		-		-	0.000	2.769	2.769
A5K Warhead Design, Fuze Design/Update, Strake Design	MIPR	SAIC/ARA : Albuquerque, NM	0.000	2.570	Aug 2017	9.122	Mar 2018	9.752	Mar 2019	-		9.752	Continuing	Continuing	-
A5K JDAM Autopilot	PO	Boeing Tech Services : St. Louis, MO	0.000	-		2.076	Mar 2018	0.915	Mar 2019	-		0.915	Continuing	Continuing	-
Subtotal			274.520	39.651		11.198		43.629		-		43.629	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	14.386	3.305	Dec 2017	-		-		-		-	0.000	17.691	17.691
A5K System T&E Support	MIPR	SAIC/ARA : Albuquerque, NM	-	-		0.164	Mar 2018	1.155	Mar 2019	-		1.155	Continuing	Continuing	-
Subtotal			14.386	3.305		0.164		1.155		-		1.155	Continuing	Continuing	N/A

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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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, Edw, FL	18.304	-		-		-		-		-	0.000	18.304	18.304
MOP Flight Test Range Support	Various	WSMR : WSMR, NM	5.646	-		-		-		-		-	0.000	5.646	5.646
MOP Target Construction and Instrumentation	Various	DTRA : Albuquerque, NM	160.311	-		-		-		-		-	0.000	160.311	160.311
MOP Test and Evaluation Activities	Various	AFTC : Albuquerque, NM	12.368	-		-		-		-		-	0.000	12.368	12.368
A5K Test and Evaluation Activities	Various	96 TW, WSMR, Holloman AFB : Eglin, Holloman, WSMR, FL	-	-		4.829	Mar 2018	25.511	Mar 2019	-		25.511	Continuing	Continuing	-
M-Code/EAJ Test and Evaluation Activities	Various	Various : Eglin, Holloman, Edwards, FL	0.000	6.100	Nov 2017	-		-		-		-	0.000	6.100	-
Subtotal			196.629	6.100		4.829		25.511		-		25.511	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	11.576	0.150	Oct 2017	-		-		-		-	0.000	11.726	11.726
M-Code/EAJ PMA	Various	AFLCMC/EBD : Eglin AFB, FL	-	3.500	Sep 2018	-		-		-		-	Continuing	Continuing	-
A5K Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	0.612	-		1.174	Jan 2018	1.206	Jan 2019	-		1.206	0.000	2.992	-
Subtotal			12.188	3.650		1.174		1.206		-		1.206	Continuing	Continuing	N/A

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			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			497.723	52.706		17.365		71.501		-		71.501	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Air Force										Date: February 2018									
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>				

	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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
<i>Direct Strike Penetrator Systems</i>																												
MOP Analysis and Testing																												
A5K Design, Development and Testing																												
M-Code/EAJ Development/Integration																												
M-Code/EAJ Test and Evaluation																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Air Force			Date: February 2018
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 Analysis and Testing	1	2017	4	2018
A5K Design, Development and Testing	4	2017	1	2021
M-Code/EAJ Development/Integration	1	2017	3	2022
M-Code/EAJ Test and Evaluation	4	2017	4	2018