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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 0605230F I Ground Based Strategic Deterrent							
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	46.966	109.260	215.721	345.041	0.000	345.041	570.373	1,527.545	2,539.060	3,018.653	13,376.000	21,748.619
641025: GROUND BASED STRATEGIC DETERRENT (GBSD)	46.966	109.260	215.721	345.041	0.000	345.041	570.373	1,527.545	2,539.060	3,018.653	13,376.000	21,748.619
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Program MDAP/MAIS Code: 493												
A. Mission Description and Budget Item Justification												
<p>The Ground Based Strategic Deterrent (GBSD) will design, develop, produce and deploy a replacement for the current Intercontinental Ballistic Missile (ICBM) Minuteman III (MM III) weapon system. The GBSD program is scoped to deliver a fully integrated weapon system beginning in FY29 timeframe to close key capability gaps and vulnerabilities identified in the GBSD Capabilities Based Assessment, GBSD Initial Capabilities Document, and the GBSD Analysis of Alternatives; and to mitigate ground-based deterrent degradation due to MM III component age-out and attrition.</p>												
<p>The GBSD program will include Prime contractor development of applicable support equipment, data, flight test hardware and infrastructure, and training material while examining and mitigating risk during the MM III to GBSD transition. This program includes any needed nuclear surety and certification and system vulnerability assessments. The major activities in the GBSD program include 1) Government system engineering (SE), analytics, and test capability development; 2) Flight System (FS) Risk Reduction; 3) Weapon System Command and Control (WSC2) Risk Reduction; 4) Launch Systems (LS) Risk Reduction; 5) Weapon System Integration (WSI) Risk Reduction. Government SE investments include development of an organic, computer-aided, model based systems engineering (MBSE), integration, test software, product life-cycle management (PLM) framework, and modernization of existing SE labs and infrastructure. FS is an integrated missile stack which includes the propulsion, post-boost, guidance, and re-entry systems (RS) sub-components. WSC2 encompasses all command and control components and interfaces, associated ground hardware, ground control equipment and associated software directly related to the survivability, monitoring and launch of the replacement flight system. LS include Launch Control Center (LCC), Launch Facility (LF) restoration, modernization of real property and structures and associated ground mechanical systems. WSI risk reduction includes non-proprietary open systems architecture with well defined interfaces and a modular design at the weapon system level to allow future modification and technology insertion.</p>												
<p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver GBSD 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, 0605833F, and 0605898F.</p>												
<p>BA4 - This program 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.</p>												

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Appropriation/Budget Activity		R-1 Program Element (Number/Name)				
3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)		PE 0605230F I Ground Based Strategic Deterrent				
B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	
Previous President's Budget	113.919	215.721	347.638	0.000	347.638	
Current President's Budget	109.260	215.721	345.041	0.000	345.041	
Total Adjustments	-4.659	0.000	-2.597	0.000	-2.597	
• 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	-2.161	0.000				
• Other Adjustments	-2.498	0.000	-2.597	0.000	-2.597	
Change Summary Explanation						
FY 2017 funding reflects a \$2.161M adjustment for Small Business Innovative Research/Small Business Transfer Technology (SBIR/STTR).						
FY 2017 funding reflects a \$2.498M adjustment for Federally Funded Research and Development Centers (FFRDC).						
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2017	FY 2018	FY 2019
Title: Technology Maturation Risk Reduction				109.260	215.721	345.041
Description: The objectives of TMRR for GBSD are as follows: 1) advance GBSD major activities, systems engineering activities, trade-studies, information technology, data management, analytical capabilities and deliver a modular, integrated weapon system preliminary design and 2) mature technologies related to the major activities and demonstrate performance of sub-system capabilities through prototyping, modeling, and simulation.						
FY 2018 Plans:						
• Continue to examine and mature FS, WSC2, cybersecurity, and associated ground system technologies, define requirements and modular architectures through trade studies, prototyping, demonstration and analysis.						
• Continue to mature and refine software integration and modular system architecture requirements.						
• Continue to mature the assessment of the current MM III LS to determine, through onsite assessments and analysis, the extent of degradation and evaluate for future upgrade, replacement, preparation, and modernization of operational and test facilities.						
• Continue to mature the weapon system preliminary design and reduce integration risk by conducting trade studies, system engineering, test activities, and systems modeling and simulation.						
• Continue to further develop analytical, information technology, and data management capabilities to ensure weapon system design information is properly secured and information dissemination between contractors.						

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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I</i> BA 4: <i>Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0605230F <i>I Ground Based Strategic Deterrent</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
<ul style="list-style-type: none"> Continue to assess fielding requirements for FS, WSC2 and LS and appropriate timelines to transition from MM III to GBSD solution. Complete System Requirements Review, cost-capability trade studies, and validate draft Capability Development Document. Expand and develop analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and information is securely transmitted between the government and each contractor. <p>FY 2019 Plans:</p> <ul style="list-style-type: none"> Expand the TMRR analytic environment and labs to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. Continue to examine and mature FS, WSC2, cybersecurity, and associated ground technologies, define requirements and modular architectures through trade studies, prototyping, demonstration, and analysis. Prototyping will include guidance navigational control, sensors, post boost propulsion system, and Hardened Intersite Cable System communications protocols. Continue to mature and refine software integration and modular system architecture requirements. Continue to mature the assessment of the current MM III LS to determine, through onsite assessments and analysis, the extent of degradation and evaluate for future upgrade, replacement, preparation, and modernization of operational and test facilities. Continue to mature the weapon system preliminary design and reduce integration risk by conducting trade studies, SE, test activities, and system modeling and simulation. Continue to further develop analytical, information technology, and data management capabilities to ensure weapon system design information dissemination between contractors. Continue to assess fielding requirements for FS, WSC2, and LS and appropriate timelines to transition from MM III to GBSD solution. Complete System Functional Review, cost capability trade studies, and validate Capability Development Document. Expand and develop analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled, and information is securely transmitted between government and each contractor. Plan for EMD, which will refine the acquisition strategy based on TMRR assessments to prepare for Request for Proposal Decision Point and increase FFRDC support to maintain the ability to own the technical baseline in EMD. <p>FY 2018 to FY 2019 Increase/Decrease Statement: Funding increases due to TMRR contractor Preliminary Design Review preparation.</p>				
Accomplishments/Planned Programs Subtotals		109.260	215.721	345.041

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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
• RDTE 04 PE 0603851F: Intercontinental Ballistic Missile - Dem/Val	99.949	10.736	41.856	-	41.856	44.109	65.582	66.944	68.165	Continuing	Continuing
• MILCON PE 0605230F: Ground Based Strategic Deterrent (GBSD)	-	-	-	-	-	108.000	151.000	135.700	105.000	201.700	701.400
Remarks											
E. Acquisition Strategy											
<p>The objective of the GBSD program strategy is to deliver a full, integrated weapon system capability that meets Air Force Global Strike Command's CDD requirements beginning in FY29. For the TMRR phase of this strategy, the Program Office competitively awarded two contracts in FY17. The objectives of TMRR for GBSD are as follows: 1) to deliver low-risk, technologically mature, integrated weapon system preliminary design; 2) incorporate a modular open systems architecture; 3) perform cost-capability analysis to aid with validation of user requirements; 4) demonstrate performance of sub-system capabilities through prototyping, modeling, and simulation. The TMRR phase will include a System Requirements Review (SRR), System Functional Review (SFR), System Software Review (SSR), and will culminate in a system Preliminary Design Review (PDR). The contractor may elect to perform additional risk reduction testing on select components to further evolve the PDR design during TMRR in order to lower component integration risk during Engineering and Manufacturing Development (EMD). The period of performance for the TMRR contracts is 4QFY17 to 4QFY20. After MS B approval, EMD contract will be competitively awarded as early as FY20.</p>											
F. Performance Metrics											
<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: PB 2019 Air Force												Date: February 2018			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>						Project (Number/Name) 641025 / <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</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
GBSD TMRR Contractor #1	C/CPFF	Boeing Def, Space, & Sec : Huntsville, AL	0.000	11.706	Aug 2017	58.346	Nov 2017	103.534	Nov 2018	-		103.534	175.174	348.760	349.160
GBSD TMRR Contractor #2	C/CPFF	Northrup Grumman Sys Corp : El Segundo, CA	0.000	12.806	Aug 2017	58.346	Nov 2017	103.600	Oct 2018	-		103.600	153.433	328.185	328.585
GBSD EMD Contracts	C/Various	TBD : TBD	0.000	-		-		-		-		-	17,587.640	17,587.640	-
Subtotal			0.000	24.512		116.692		207.134		-		207.134	17,916.247	18,264.585	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
GBSD Integration Support Contract (TMRR)	C/FFP	BAE : Hill AFB, UT	29.144	39.214	Oct 2016	41.205	Oct 2017	25.249	Oct 2018	-		25.249	87.074	221.886	-
GBSD Electronic Parts Strategy and Commonality (TMRR)	MIPR	Naval Surface Warfare Center (NSWC) Crane : Crane, IN	3.779	6.359	Dec 2016	4.802	Dec 2017	6.946	Nov 2018	-		6.946	0.000	21.886	-
GBSD Federally Funded Research and Development Center (FFRDC) (TMRR)	MIPR	Aerospace Corporation : El Segundo, CA	2.630	5.404	Nov 2016	5.610	Oct 2017	2.295	Nov 2018	-		2.295	13.260	29.199	-
GBSD MITRE (TMRR)	MIPR	MITRE : Bedford, MA	1.964	2.642	Dec 2016	3.492	Oct 2017	5.100	Nov 2018	-		5.100	5.272	18.470	-
GBSD Technical Area Task Support (TMRR)	MIPR	Air Force Global Strike Command : Barksdale AFB, LA	1.731	1.218	Feb 2017	-		-		-		-	0.000	2.949	-
GBSD Software Engineering Institute (TMRR)	MIPR	Carnegie Mellon : Pittsburgh, PA	0.360	1.979	Feb 2017	2.569	Oct 2017	1.400	Nov 2018	-		1.400	7.006	13.314	-
GBSD Reentry Systems (RS) FFRDC Support and Analysis (TMRR)	MIPR	Sandia National Laboratories : Various	0.000	8.443	Mar 2017	6.510	Nov 2017	6.250	Oct 2018	-		6.250	0.000	21.203	-

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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
GBSD RS FFRDC Analysis and Acquisition Intelligence Support (TMRR)	MIPR	MIT Lincoln Labs : Lexington, MA	0.000	0.580	Apr 2017	6.426	Oct 2017	0.456	Oct 2018	-		0.456	24.892	32.354	-
GBSD EMD Support	C/Various	TBD : TBD	0.000	-		-		-		-		-	1,702.011	1,702.011	-
Subtotal			39.608	65.839		70.614		47.696		-		47.696	1,839.515	2,063.272	N/A
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
GBSD Test and Assessments (TMRR)	Various	Various : Various	2.196	3.370	Jan 2017	4.715	Nov 2017	18.948	Jan 2019	-		18.948	0.000	29.229	-
GBSD Cybersecurity, Test and Evaluation Framework, Codes/Crypto (TMRR)	MIPR	Johns Hopkins University-Applied Physics Lab : Laurel, MD	1.934	2.750	May 2017	2.179	Jan 2018	8.205	Oct 2018	-		8.205	1.912	16.980	-
GBSD Integrated Test Team (TMRR)	PO	Arnold engineering Development Complex : Arnold AFB, TN	0.549	1.791	Nov 2016	3.269	Oct 2017	4.300	Oct 2018	-		4.300	14.480	24.389	-
GBSD Independent Operational Test Agency (TMRR)	PO	Air Force Operational and Evaluation Center : Hill AFB, UT	0.000	0.773	Mar 2017	1.518	Jan 2018	1.466	Oct 2018	-		1.466	215.583	219.340	-
GBSD Integrated Threat Analysis and Simulation Environment (ITASE) I (TMRR)	MIPR	DIA-Missile and Space Intelligence Center : Redstone Arsenal, AL	0.000	2.402	Jan 2017	2.283	Jan 2018	3.978	Oct 2018	-		3.978	5.997	14.660	-
GBSD ITASE II (TMRR)	MIPR	DIA-National Air and Space Intelligence Center : Fairborn, OH	0.000	0.241	Aug 2017	2.313	Nov 2017	-		-		-	3.496	6.050	-

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Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0605230F / Ground Based Strategic Deterrent				Project (Number/Name) 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)					
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
GBSD Nuclear Dust and Debris Environments Study (TMRR)	MIPR	Air Force Research Lab : Wright Patterson AFB, OH	0.000	0.629	Aug 2017	0.809	Dec 2017	1.000	Oct 2018	-		1.000	1.352	3.790	-
GBSD RS Test and Advanced Technology Interface (TMRR)	MIPR	SNL - Sandia Nat'l Labs : Various	0.000	3.095	Jan 2017	6.077	Jan 2017	17.900	Oct 2018	-		17.900	15.000	42.072	-
GBSD Data Tools & Infrastructure (TMRR)	Various	Various : Various	-	0.354	Aug 2017	-		9.300	Oct 2018	-		9.300	53.245	62.899	-
GBSD Defense Accelerator (TMRR)	MIPR	Army Research Lab : Adelphi, MD	-	1.500	Apr 2017	-		-		-		-	0.000	1.500	-
GBSD Launch Systems LF-26 (TMRR)	TBD	TBD : TBD	-	-		-		3.010	Jan 2019	-		3.010	0.000	3.010	-
GBSD Launch Systems Inspection (TMRR)	Various	Various : Various	-	0.941	Jul 2017	-		-		-		-	0.079	1.020	-
GBSD Software Support (TMRR)	PO	309th SMXG : Hill AFB, UT	-	0.444	Jul 2017	1.416	Jan 2018	1.220	Oct 2018	-		1.220	3.587	6.667	-
GBSD EMD Test Support	C/Various	TBD : TBD	0.000	-		-		-		-		-	844.954	844.954	-
Subtotal			4.679	18.290		24.579		69.327		-		69.327	1,159.685	1,276.560	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
GBSD PMA	Various	Various : Various	2.679	0.619	Oct 2016	3.836	Oct 2017	2.535	Oct 2018	-		2.535	88.020	97.689	-
GBSD Integration Support Contract (TMRR)	C/FFP	BAE : Hill AFB, UT	-	-		-		13.007	Oct 2018	-		13.007	24.964	37.971	-
GBSD Electronics Parts Strategy and Commonality (TMRR)	C/Various	Naval Surface War Ctr : Crane, IN	0.000	-		-		1.737	Nov 2018	-		1.737	0.000	1.737	-
GBSD Federally Funded Research and	C/Various	Aerospace Corporation : El Segundo, CA	-	-		-		2.805	Nov 2018	-		2.805	0.000	2.805	-

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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
Development Center (FFRDC) (TMRR)															
EMD Acquisition Strategy Support	TBD	Oasis : Hill AFB, UT	0.000	-		-		0.800		-		0.800	3.200	4.000	-
Subtotal			2.679	0.619		3.836		20.884		-		20.884	116.184	144.202	N/A
			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			46.966	109.260		215.721		345.041		-		345.041	21,031.631	21,748.619	N/A

Remarks

For FY19 costs, the SPO revised its PMA determination strategy, which resulted in additional line items for the management services section of the R-3.

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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 0605230F / Ground Based Strategic Deterrent					Project (Number/Name) 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)									

	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
Ground Based Strategic Deterrent (GBSD)																												
TMRR Phase																												
PDR (Jun 2020)																												
Milestone B (Sep 2020)																												
EMD Phase																												

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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 0605230F / <i>Ground Based Strategic Deterrent</i>	Project (Number/Name) 641025 / <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Ground Based Strategic Deterrent (GBSD)</i>				
TMRR Phase	1	2017	4	2020
PDR (Jun 2020)	3	2020	3	2020
Milestone B (Sep 2020)	4	2020	4	2020
EMD Phase	1	2021	4	2023