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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 0605230F / <i>Ground Based Strategic Deterrent</i>
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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	875.413	538.643	1,447.113	2,553.541	0.000	2,553.541	-	-	-	-	-	-
641025: <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>	875.413	538.643	1,447.113	2,553.541	0.000	2,553.541	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 493

A. Mission Description and Budget Item Justification

The Ground Based Strategic Deterrent (GBSD) program will design, develop, produce and deploy a replacement for the current Minuteman III (MM III) Intercontinental Ballistic Missile (ICBM) weapon system in order to maintain a safe, secure, reliable, and effective nuclear deterrent. The GBSD program will deliver a fully integrated weapon system beginning in Fiscal Year 2029 to lower lifecycle costs and to close key capability gaps and vulnerabilities identified in the GBSD Capabilities Based Assessment, GBSD Capabilities Development Document, and the GBSD Analysis of Alternatives. GBSD will also mitigate ground-based deterrent degradation due to MM III component age-out and attrition.

The GBSD program will include prime contractor development of applicable support equipment, data, flight test hardware and infrastructure, and training systems while examining and mitigating risk during the MM III to GBSD transition. GBSD program office has partnered with MM III program office to facilitate communication and integration of the weapon system recapitalization during the MM III to GBSD transition. This program includes any needed nuclear surety and certification and system vulnerability assessments.

During the Engineering and Manufacturing Development phase, the GBSD program will execute 1) government system engineering, analytics, and test capability development; 2) air vehicle equipment development; 3) command & launch systems development; 4) launch systems development; 5) support systems development; and 6) weapon system integration.

Government systems engineering investments include development of model-based systems engineering (MBSE), integration, test software, product life-cycle management framework, and modernization of existing system engineering labs and infrastructure. Air vehicle equipment is an integrated missile stack which includes the propulsion, post-boost, guidance, and re-entry systems sub-components. Command & launch 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. Launch systems include launch centers, launch facilities, and structures and associated ground mechanical systems. Support systems include operator and maintenance training systems hardware and software, security system architecture, transport support equipment, program office and weapon system facilities, and peculiar/common support equipment. Weapon system integration 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. As GBSD progresses toward Critical Design Review (CDR), the GBSD

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<p>weapon system design will dictate the parameters for the MILCON real property requirements and their integration with the weapon system component requirements as these are inextricably linked.</p> <p>The significant increase in funding required for FY22 is to execute the Engineering & Manufacturing Development (EMD) Contract to advance GBSD major activities to include systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design. The program will modify, modernize, and expand the analytic environment and labs to support EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment / infrastructure to perform digital activities, collaborate with, and communicate across stakeholders. Based on success during the Technology Maturation & Risk Reduction contract, this program will continue to examine and mature air vehicle equipment, command and launch, cybersecurity, operator and maintenance training systems hardware and software, security system architecture, transport sub-systems, Peculiar/Common Support Equipment and associated ground technologies. The program will also continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management. This will continue to require execution and improvement to the unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. The program will also expand and mature the analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. The program will continue to develop Vandenberg AFB test capabilities and ensure Western Range Test capabilities for the Flight Test Program. Additionally, the GBSD program funds all required developmental and operational test and evaluation activities to meet initial and full operational capability milestones including, but not limited to, developing, improving and modernizing test capabilities essential to reaching those milestones when existing test capabilities are inadequate or non-existent. The program will also continue integrating requirement for dual-capable, air based, survivable launch capability. Finally, the program will establish a government-owned and government-operated DevSecOps/software stack.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program elements 0605833F or 0605831F. In FY2020 14.416M and in FY2021 25.469M was expended for civilian pay expenses in this program element.</p> <p>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.</p>		

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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	557.495	1,524.759	2,536.450	0.000	2,536.450
Current President's Budget	538.643	1,447.113	2,553.541	0.000	2,553.541
Total Adjustments	-18.852	-77.646	17.091	0.000	17.091
• Congressional General Reductions	0.000	-2.646			
• Congressional Directed Reductions	0.000	-75.000			
• 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	-18.852	0.000			
• Other Adjustments	0.000	0.000	17.091	0.000	17.091

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 641025: *GROUND BASED STRATEGIC DETERRENT (GBSD)*

Congressional Add: *Congressional Add- Risk Reduction*

Congressional Add: *Congressional Directed Transfer- SLP-A*

Congressional Add Subtotals for Project: 641025

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	65.100	-
	22.022	-
	87.122	-
	87.122	-

Change Summary Explanation

FY2020 funding reflects a Small Business Innovation Research (SBIR) adjustment of \$18.852 million.

FY2021 funding reflects Congressionally Directed Reductions of \$60 million for "excess to need" and \$15 million for "Restoring acquisition accountability: acquisition strategy for planning and design." FY2021 funding also reflects a \$2.646 million Congressional General Reduction for an undistributed mark.

FY2022 funding reflects an increase to fund the program to latest Independent Cost Estimate.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Technology Maturation & Risk Reduction (TMRR)	337.864	0.000	0.000
Description: The objectives of TMRR for GBSD were 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. The TMRR Major Thrust concluded in Fiscal Year 2020.			

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>				
<p>Title: Engineering & Manufacturing Development (EMD)</p> <p>Description: The objectives of EMD for GBSD are: 1) advance GBSD major activities, systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design, 2) prototype and test mature technologies related to the major activities and demonstrate performance of sub-system and system capabilities through prototyping and testing and 3) engage in rapid prototyping events to mature future design increments.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Execute the EMD Contract to advance GBSD major activities to include systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design. • Modify, modernize, and expand the analytic environment and labs to support EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment/infrastructure to perform digital activities, collaborate with, and communicate across stakeholders. • Continue to examine and mature air vehicle equipment, command and launch, cybersecurity, operator and maintenance training systems hardware and software, security system architecture, transport sub-systems, and associated ground technologies. Define requirements and modular architectures through trade studies, prototyping, demonstration, and analysis. • Continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management. • Continue to mature the assessment of the current MM III launch systems 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. • Execute all government critical path activities to include but not limited to Preliminary Draft Environmental Impact Statement (PDEIS), Coordinating Draft Environmental Impact Studies (EIS), Environmental Baseline Surveys, and Section 106 Programmatic Agreement. • Continue to mature the weapon system by conducting trade studies, system engineering, test activities, and system modeling and simulation. 		113.657	1,447.113	2,553.541

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> • Continue to further develop analytical, information technology, and data management capabilities. • Implement information systems and information technology design to support EMD execution. • Modify and expand GBSD workspace to accommodate a growing workforce. • Continue to assess fielding requirements for air vehicle equipment, command & launch, and launch systems and appropriate timelines to transition from MM III to GBSD solution. • Conduct planning for the use of MBSE tools during Operations and Sustainment phase in order to transform ICBM sustainment and supply chain management. • Continue to execute and improve the unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. • Expand and mature the analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. • Continue to refine Security Classification Guide, update impacts, and implement updates and changes through all Government and contractor programmatic activities. • Continue to increase Federally Funded Research and Development Centers (FFRDC)/University-Affiliated Research Center (UARC) support to maintain the ability to own the technical baseline in EMD. • Continue to mature support systems to include Common Support Equipment (CSE)/Peculiar Support Equipment (PSE) and all transportation equipment. • Plan and execute critical software risk reduction activities. • Expand the Information Systems/Information Technology/Information Assurance infrastructure networks and personnel required to support Top Secret, Special Access Programs, and collateral activities and expand capability at mission partner operating locations and network access points. • Develop, improve & modernize government test capabilities required for successful Developmental Test (DT) and Operational Test (OT) including but not limited to, Vandenberg AFB Test capabilities, Western Range Test capabilities, Broad Ocean Area Terminal Area Scoring Test Capability, improvements to the Air Force Research Lab 1-42 test cell at Edwards AFB and security and capability upgrades at several Arnold Engineering Development Complex test sites. Modernization and improvement of LF-26 at Vandenberg AFB begins in FY21. • Continue integrating requirement for dual-capable, air-based, survivable launch capability. • Develop a common cryptographic device and supporting equipment for use in multiple subsystems and/or networks throughout the GBSD weapon system. • Integrate the Mk-21A Reentry Vehicle (Program 0101328F), ICBM Fuze Modernization (Program 0604933F), and GBSD test programs. • Expand government-owned and government-operated DevSecOps/software stack. <p>FY 2022 Plans:</p>				

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> • Execute the EMD Contract to advance GBSD major activities to include systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design. • Modify, modernize, and expand the analytic environment and labs to support EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment/infrastructure to perform digital activities, collaborate with, and communicate across stakeholders. • Continue to examine and mature air vehicle equipment, command and launch, cybersecurity, operator and maintenance training systems hardware and software, security system architecture, transport sub-systems, and associated ground technologies. Define requirements and modular architectures through trade studies, prototyping, demonstration, and analysis. • Continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management. • Continue to mature the assessment of the current MM III launch systems 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. • Execute all government critical path activities to include but not limited to Preliminary Draft Environmental Impact Statement (PDEIS), Coordinating Draft Environmental Impact Studies (EIS), Environmental Baseline Surveys, and Section 106 Programmatic Agreement. • Continue to mature the weapon system by conducting trade studies, system engineering, test activities, and system modeling and simulation. • Continue to further develop analytical, information technology, and data management capabilities. • Implement information systems and information technology design to support EMD execution. • Continue to assess fielding requirements for air vehicle equipment, command & launch, and launch systems and appropriate timelines to transition from MM III to GBSD solution. • Conduct planning for the use of MBSE tools during Operations and Sustainment phase in order to transform ICBM sustainment and supply chain management. • Continue to execute and improve the unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. • Expand and mature the analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. • Continue to refine Security Classification Guide, update impacts, and implement updates and changes through all Government and contractor programmatic activities. • Continue to increase FFRDC/UARC support to maintain the ability to own the technical baseline in EMD. • Continue to mature support systems to include CSE/PSE and all transportation equipment. • Plan and execute critical software risk reduction activities. 			

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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> • Expand the Information Systems/Information Technology/Information Assurance infrastructure networks and personnel required to support Top Secret, Special Access Programs, and collateral activities and expand capability at mission partner operating locations and network access points. • Develop, improve & modernize government test capabilities required for successful Developmental Test (DT) and Operational Test (OT) including but not limited to, Vandenberg AFB Test capabilities, Western Range Test capabilities, Broad Ocean Area Terminal Area Scoring Test Capability, and various Noise, Vibration and Harshness and Nuclear Hardness and Survivability test sites/beds as required. Modernization and improvement of LF-04 at Vandenberg AFB begins in FY22. • Continue integrating requirement for dual-capable, air-based, survivable launch capability. • Develop a common cryptographic device and supporting equipment for use in multiple subsystems and/or networks throughout the GBSD weapon system. • Integrate the Mk-21A Reentry Vehicle (Program 0101328F), ICBM Fuze Modernization (Program 0604933F), and GBSD test programs. • Expand government-owned and government-operated DevSecOps/software stack. • Execute all government critical path activities. • Conduct studies and initiatives to build schedule margin, reduce risk in the Minuteman III-to-GBSD transition, and reduce life cycle costs as the program progresses through the EMD phase to the Production phase. • Modify and expand GBSD workspace at all operating locations to accommodate a growing workforce and provide the tools for the workforce to own the technical baseline. <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funds increased due to continued expansion of EMD activities to solidify the GBSD design as well as dedicating resources to build test assets and prepare test sites for GBSD First Flight scheduled in FY24.</p>			
Accomplishments/Planned Programs Subtotals	451.521	1,447.113	2,553.541

	FY 2020	FY 2021
<i>Congressional Add:</i> Congressional Add- Risk Reduction	65.100	-
<i>FY 2020 Accomplishments:</i> <ul style="list-style-type: none"> • Develop digital software factory to reduce software development risk • Develop GBSD Cloud Infrastructure and initiating DevSecOps deployment • Initiate environmental impact studies • Continue to grow the organization in preparation for EMD • Install critical SAP IT infrastructure to protect nuclear program data 		

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	FY 2020	FY 2021
• Initiate EMD risk reduction activities, to include Guidance Component Life Testing, Booster Ground Testing, and additional Modeling & Simulation activities		
Congressional Add: Congressional Directed Transfer- SLP-A	22.022	-
FY 2020 Accomplishments: • Integrate requirement for dual-capable, air-based, survivable launch capability from the Airborne Launch Control System-Replacement (ALCS-R) program, previously budgeted in Program 0101213F, Project 672983.		
Congressional Adds Subtotals	87.122	-

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 04 PE 0603851F: <i>Intercontinental Ballistic Missile - Dem/Val</i>	29.881	32.899	49.621	-	49.621	-	-	-	-	-	-
• MPAF 01 MPAF 01	0.000	0.000	10.895	-	10.895	-	-	-	-	-	-
MGBSD0: GBSD SQU...: <i>GBSD SQUADRONS</i>											
• MILCON PE 0101233F: <i>GBSD SQUADRONS</i>	40.000	89.200	168.099	-	168.099	-	-	-	-	-	-
• O&M PE 0101233F: <i>GBSD SQUADRONS</i>	3.250	3.337	20.001	0.000	20.001	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The objective of the GBSD program strategy is to deliver a full, integrated weapon system capability that meets Air Force Global Strike Command's Capability Development Document requirements beginning in Fiscal Year 2029. For the Engineering and Manufacturing Development (EMD) phase of this strategy, the Program Office awarded an EMD contract in the 4th quarter of Fiscal Year 2020. The objectives of EMD for GBSD are as follows: 1) to deliver low-risk, technologically mature, integrated weapon system baseline design; 2) develop flexible system architecture with options for future on-ramps and off-ramps to mitigate program risks; 3) embrace MBSE/digital engineering to streamline system development activities and time-lines; 4) align contract incentives to mitigate schedule and performance risk; 5) utilize MBSE processes and tools to create schedule margin and pull surety, safety, cyber, and test activities to the left for time certain delivery; 6) ensure government owns key interfaces and data rights; 7) pursue "smart commonality" with Navy, Space, and Missile Defense Agency. The EMD phase will include an EMD Baseline Review, Critical Design Review, First Flight Test, Full Functional System Test, System Qualification/System Verification Review, Nuclear Certification, Developmental Test, Operational Test, and will culminate with early production and weapon system deployment. The program will also assess the cost and schedule risks associated with

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every requirement. The period of performance for the EMD contract is 4th quarter of Fiscal Year 2020 to the second quarter of Fiscal Year 2028 with 5 options for early production and deployment. These efforts will ultimately extend the capabilities of the ground-based leg of the nuclear triad through 2075.

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

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			
GBSD TMRR Contractor #1	C/CPFF	Boeing Def, Space, & Sec : Huntsville, AL	242.567	18.548	Oct 2019	-		-		-		-	-	-	261.115
GBSD TMRR Contractor #2	C/CPFF	Northrop Grumman Sys Corp : El Segundo, CA	244.791	125.999	Oct 2019	-		-		-		-	-	-	370.790
GBSD EMD Contract	C/CPFF	Northrop Grumman Sys Corp : El Segundo, CA	0.000	113.657	Sep 2020	1,113.603	Oct 2020	2,193.891	Oct 2021	-		2,193.891	-	-	13,293.563
GBSD Security Classification Guide Compliance	C/FFP	Lockheed Martin Corp : King of Prussia, PA	1.506	0.000	Oct 2019	-		-		-		-	-	-	1.506
Subtotal			488.864	258.204		1,113.603		2,193.891		-		2,193.891	-	-	N/A

Remarks
 EMD phase began in the fourth quarter FY20; FY22 funding increase for the continued expansion of EMD activities in solidifying the GBSD design and associated requirements.
 GBSD TMRR Contractor #1- Total Cost lower than Target Value due to contractor decision not to bid for EMD contract and resultant government determination to cease funding for TMRR effort.
 GBSD TMRR Contractor #1 and #2 contracts were modified to include costs for Security Classification Guide Compliance.
 GBSD Security Classification Guide Compliance includes compliance costs for the TMRR unsuccessful Offeror.

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			
GBSD Integration Support Contract	C/FFP	BAE : Hill AFB, UT	105.969	40.346	Oct 2019	43.059	Oct 2020	44.668	Oct 2021	-		44.668	-	-	519.735
GBSD Electronic Parts Strategy and Commonality	MIPR	Naval Surface Warfare Center Crane : Crane, IN	13.366	3.643	Nov 2019	4.270	Nov 2020	4.900	Nov 2021	-		4.900	-	-	-
GBSD System Engineering and Acquisition Support	MIPR	Aerospace Corporation : El Segundo, CA	14.431	7.803	Nov 2019	8.832	Nov 2020	9.575	Nov 2021	-		9.575	-	-	-

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3600 / 4				PE 0605230F / Ground Based Strategic Deterrent				641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)							
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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 Acquisition Support and System Engineering	MIPR	MITRE : Bedford, MA	16.801	11.864	Nov 2019	14.035	Nov 2020	15.000	Nov 2021	-		15.000	-	-	-
GBSD Software Engineering Institute	MIPR	Carnegie Mellon : Pittsburgh, PA	3.001	2.079	Nov 2019	2.075	Nov 2020	2.000	Nov 2021	-		2.000	-	-	-
GBSD Reentry Systems (RS) FFRDC Support and Analysis	MIPR	Sandia National Laboratories : Various	18.786	7.750	Oct 2019	3.828	Oct 2020	4.427	Oct 2021	-		4.427	-	-	-
GBSD RS FFRDC Analysis and Acquisition Intelligence Support	MIPR	MIT Lincoln Labs : Lexington, MA	2.862	1.126	Oct 2019	1.300	Oct 2020	1.600	Oct 2021	-		1.600	-	-	-
GBSD Operations Research Analyst Support	C/FFP	Tecolote Research : Hill AFB, UT	2.357	2.365	Oct 2019	3.300	Oct 2020	3.625	Oct 2021	-		3.625	-	-	35.487
GBSD Surety and Certification Engineering Services	MIPR	Various : Various	6.396	3.060	Nov 2019	3.989	Nov 2020	2.500	Nov 2021	-		2.500	-	-	-
GBSD Administrative Support	Various	Various : Various	0.908	4.665	Nov 2019	2.975	Nov 2020	2.975	Jan 2022	-		2.975	-	-	-
GBSD Technical Design Agent for NC2 Codes/ Crypto	MIPR	Sandia National Labs : Various	0.000	6.500	Nov 2019	13.500	Nov 2020	15.200	Nov 2021	-		15.200	-	-	-
GBSD Mantech	RO	Man Tech International : Herndon, VA	2.389	8.615	Dec 2019	9.455	Dec 2020	10.713	Dec 2021	-		10.713	-	-	-
GBSD Civilian Manpower	Various	US Gov Civilians : Hill AFB, UT	6.512	14.416	Oct 2019	25.468	Oct 2020	25.000	Oct 2021	-		25.000	-	-	-
GBSD NEPA Analysis	MIPR	Various : Various	0.000	10.288	Apr 2020	10.935	Oct 2020	1.300	Nov 2021	-		1.300	-	-	-
RV LM OEM Support	C/CPAF	Lockheed Martin Corp : Bethesda, MD	0.000	-		1.350	Jan 2021	2.000	Dec 2021	-		2.000	-	-	-
GBSD Enterprise Support	C/Various	Various : Various	10.685	0.699	Oct 2019	1.956	Oct 2020	0.650	Dec 2021	-		0.650	-	-	-
Subtotal			204.463	125.219		150.327		146.133		-		146.133	-	-	N/A

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

Remarks
 GBSD is spearheading the Owning The Technical Baseline (OTTB) approach for system acquisition. This approach utilizes additional support efforts that would typically be performed by a Prime Contractor thus increasing costs within Cost Category Items.
 GBSD OASIS A&AS Support renamed GBSD Administrative Support.
 GBSD Technical Area Task Support (TMRR) completed and prior year funding amounts were incorporated into the GBSD Enterprise Support line.
 GBSD Civilian Manpower increases due to increased DCA allocations in order to support EMD and are in addition to any other planned civilian hiring.
 GBSD Environmental Analysis requirements have been moved to the GBSD NEPA Analysis.

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			
GBSD Cybersecurity, Test and Evaluation Framework, Codes/Crypto	MIPR	Johns Hopkins University-Applied Physics Lab : Laurel, MD	24.750	13.200	Oct 2019	15.008	Oct 2020	15.500	Oct 2021	-		15.500	-	-	-
GBSD Integrated Test Team	PO	Arnold Engineering Development Complex : Arnold AFB, TN	8.986	6.048	Oct 2019	11.219	Oct 2020	16.630	Oct 2021	-		16.630	-	-	-
GBSD Independent Operational Test Agency	PO	Air Force Operational Test and Evaluation Center : Hill AFB, UT	2.463	1.848	Oct 2019	3.860	Oct 2020	5.065	Oct 2021	-		5.065	-	-	-
GBSD Integrated Threat Analysis and Simulation Environment (ITASE) 1	MIPR	DIA-Missile and Space Intelligence Center : Redstone Arsenal, AL	9.461	5.600	Nov 2019	5.500	Nov 2020	5.000	Nov 2021	-		5.000	-	-	-
GBSD ITASE 2	MIPR	National Air and Space Intelligence Center : Fairborn, OH	1.783	0.300	Nov 2019	0.150	Dec 2020	1.000	Nov 2021	-		1.000	-	-	-
GBSD Nuclear Dust and Debris Environments Study	MIPR	Air Force Research Lab : Wright Patterson AFB, OH	2.284	0.400	Nov 2019	0.878	Nov 2020	0.000		-		0.000	-	-	-

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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			
GBSD Launch Systems LF-26 (TMRR)	Various	Various : Various	0.041	0.511	Oct 2019	0.025	Dec 2020	0.000		-		0.000	-	-	-
GBSD Software Support	PO	309th / 517th SWEG : Hill AFB, UT	5.479	11.870	Oct 2019	23.283	Oct 2020	26.206	Oct 2021	-		26.206	-	-	-
GBSD NSCCA Support	PO	309th / 516th SWES : Hill AFB, UT	0.000	5.400	Oct 2019	8.300	Oct 2020	11.750	Oct 2021	-		11.750	-	-	-
GBSD Instrument Testing	MIPR	Aerospace Corporation : El Segundo, CA	1.824	5.200	Nov 2019	-		0.320	Nov 2021	-		0.320	-	-	-
GBSD / Missile Defense Agency Silo Fly-out Modelling / Simulation Development	MIPR	Various : Various	0.900	5.191	Nov 2019	5.733	Nov 2020	6.960	Nov 2021	-		6.960	-	-	-
GBSD Rapid Assessment Technology / LS Support	MIPR	Various : Various	0.270	4.670	Apr 2020	6.100	Mar 2021	6.000	Mar 2022	-		6.000	-	-	-
GBSD Joint Test Assembly Encryption	MIPR	Sandia National Labs : Various	1.500	6.200	Nov 2019	13.000	Dec 2020	10.700	Dec 2021	-		10.700	-	-	-
GBSD Joint Environment Test Unit / Joint Test Assembly National Nuclear Security Agency Cost Share	MIPR	Various : Various	1.500	2.000	Nov 2019	1.200	Dec 2020	0.940	Dec 2021	-		0.940	-	-	-
NSWC Corona Support	MIPR	Naval Surface Warfare Center : Corona, CA	0.000	0.600	May 2020	1.149	Dec 2020	1.201	Dec 2021	-		1.201	-	-	-
GBSD Enterprise Test and Assessments	C/Various	Various : Various	7.265	1.388		0.045	Nov 2020	0.302	Nov 2021	-		0.302	-	-	-
Subtotal			68.506	70.426		95.450		107.574		-		107.574	-	-	N/A

Remarks
 GBSD RS Test and Advanced Technology Interface (TMRR) completed and prior year funding amounts were incorporated into the GBSD Enterprise Test and Assessments line.
 GBSD Defense Accelerator (TMRR) has completed and prior year funding amounts were incorporated into the GBSD Enterprise Test and Assessments line.
 GBSD NSCCA Support addresses Nuclear Safety Cross-Check Analysis (NSCCA) software support and funds 40 FTEs in FY22.

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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			

GBSD Test Vehicles, GBSD Booster Ground Test, GBSD Guidance, Navigation, and Control Instruments for Developmental Testing, and GBSD Reentry System/Reentry Vehicle Modelling/Simulation Environment Development items moved to the Product Development section under the EMD Prime Contract.
GBSD Software Support will fund 102 FTEs in FY22.

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			
GBSD Integration Support Contract	C/FFP	BAE : Hill AFB, UT	57.052	21.724	Oct 2019	22.741	Nov 2020	23.590	Oct 2021	-		23.590	-	-	277.170
GBSD Electronics Parts Strategy and Commonality	C/Various	Naval Surface Warfare Center : Crane, IN	5.728	0.911	Nov 2019	1.830	Nov 2020	2.100	Nov 2021	-		2.100	-	-	-
GBSD System Engineering and Acquisition Support	C/Various	Aerospace Corporation : El Segundo, CA	17.638	9.536	Nov 2019	10.795	Nov 2020	11.703	Nov 2021	-		11.703	-	-	-
GBSD IS/IT Support	C/Various	Various : Various	22.515	11.654	Oct 2019	6.441	Oct 2020	12.000	Oct 2021	-		12.000	-	-	-
GBSD DevSecOps, Cloud, & Infrastructure	Various	Various : Various	0.270	25.513	Nov 2019	32.536	Nov 2020	40.000	Nov 2021	-		40.000	-	-	-
GBSD PMA	Various	Various : Various	10.377	15.456	Oct 2019	13.390	Oct 2020	16.550	Oct 2021	-		16.550	-	-	-
Subtotal			113.580	84.794		87.733		105.943		-		105.943	-	-	N/A

Remarks
GBSD Enterprise Infrastructure has been incorporated into GBSD DevSecOps.

	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	875.413	538.643	1,447.113	2,553.541	-	2,553.541	-	-	N/A

Remarks

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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 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	2020	4	2020
9th Quarter Technical Interchange Meeting (Dec 2019)	1	2020	1	2020
Software Specification Review (Feb 2020)	2	2020	2	2020
Preliminary Design Review (Apr 2020)	3	2020	3	2020
Milestone B (Aug 2020)	4	2020	4	2020
EMD Phase	4	2020	4	2026
Critical Design Review (Jul 2023)	4	2023	4	2023
Milestone C (May 2026)	3	2026	3	2026