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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force **Date:** February 2019

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	89.781	105.508	97.276	0.000	97.276	48.827	50.947	25.521	13.929	Continuing	Continuing
675345: <i>B-2 Modernization</i>	0.000	50.017	78.419	82.925	0.000	82.925	34.228	36.044	10.346	13.929	Continuing	Continuing
676021: <i>BASELINE SUPPORT</i>	0.000	13.052	14.089	14.351	0.000	14.351	14.599	14.903	15.175	0.000	Continuing	Continuing
676022: <i>AEHF Strategic Comm</i>	0.000	26.712	13.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	39.712

Note

This program, BA 7, PE 0101127F, project 675345, B-2 Expanded Strike, is a new start.

\$13M in FY 2019 BPAC 676022 is misaligned in the database, funds are being executed within FY 2019 BPAC 675345.

A. Mission Description and Budget Item Justification

The B-2 is currently undergoing modernization of avionics/communications systems, engines, armament systems, low observable components, core training system components, aircraft supportability improvements, and support equipment development.

The Air Force will also study multiple structural, avionics, and engine modifications that could improve the performance of the aircraft and engines and reduce maintenance man-hours and the logistics footprint of the fleet. Focus of the studies will be on non-mission capable (maintenance) drivers, safety issues, and obsolescence issues through modernization of key components in the airframe, avionics, and engines resulting in improved aircraft availability of a high demand/low density fleet.

The Adaptive Communication Suite (ACS) provides SATCOM connectivity for Command and Control enroute to the target with Airborne Mission Transfer and Beyond Line-of-Site Situational Awareness. This effort includes incremental improvements to the suite of B-2 ACS UHF communications system.

B-2 Armament upgrades integrate new and/or advanced weapons on the B-2 to attack a wider array of target sets, to include hardened, deeply buried targets, as well as destroy more targets per sortie. Upgrades includes Flex Strike, JASSM-ER integration and Expanded Strike.

The Low Observable Signature and Supportability Modifications (LOSSM) program supports the B-2 ability to penetrate anti-access combat environments, performing missions directed by the National Command Authority while ensuring aircrew survivability. The LOSSM program reduces low observable (LO) maintenance, and stabilizes and improves the combat-ready LO signature for the B-2 fleet.

The B-2 Crash Survivable Memory Unit (CSMU) provides a more capable Flight Data Recorder (FDR) with increased capacity for storing Flight Information Data (FID) for recovery and use in the event of a mishap.

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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development		R-1 Program Element (Number/Name) PE 0101127F I B-2 Squadrons				
<p>The Radar Aided Targeting System (RATS) is planned to be a software only solution implemented in several B-2 system level Operational Flight Programs (OFPs) to provide radar-aided enhanced targeting capability through weapon hand-off navigational updates for guided nuclear weapons in a non-GPS environment.</p> <p>The B-2 Identification Friend or Foe (IFF) Mode 5/S modification program provides new equipment to the B-2 for airspace compliance on a global stage. Mode 5 is a new, cryptographically secure mode used solely by the military, which is replacing Mode 4. Mode S is a secondary surveillance radar process that allows selective interrogation of aircraft using a uniquely assigned 24-bit address.</p> <p>The B-2 Training System upgrades include updates to training device hardware and components, simulation software, courseware and academic materials, instructional system design architectures, engineering drawings, and system documentation that is not driven by a funded aircraft modification.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver B-2 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>As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.</p> <p>This program is in Budget Activity 7, Operational System Development because this budget activity includes development efforts to upgrade systems that have been fielded or have received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.</p>						
B. Program Change Summary (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget		193.108	105.561	106.376	0.000	106.376
Current President's Budget		89.781	105.508	97.276	0.000	97.276
Total Adjustments		-103.327	-0.053	-9.100	0.000	-9.100
• Congressional General Reductions		-0.033	-0.053			
• Congressional Directed Reductions		-97.000	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		-6.294	0.000			
• Other Adjustments		0.000	0.000	-9.100	0.000	-9.100
Change Summary Explanation						
FY 2018: Congress reduced AEHF SATCOM by \$97M, \$0.033M for Congressional General Reduction, and \$6.294M for SBIR.						

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FY 2020: \$9.1M reduction from Expanded Strike, Airspace Compliance, CSMU and LOSSM to re-phase early to need funding.		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons				Project (Number/Name) 675345 / B-2 Modernization			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
675345: B-2 Modernization	0.000	50.017	78.419	82.925	0.000	82.925	34.228	36.044	10.346	13.929	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 7, PE 0101127F, project 675345, B-2 Expanded Strike, is a new start.

\$13M of FY19 funding for LOSSM is misaligned into BPAC 676022 AEHF SATCOM, due to a database error.

A. Mission Description and Budget Item Justification

The B-2 is currently undergoing modernization of avionics/communications systems, engines, armament systems, low observable components, core training system components, aircraft supportability improvements, and support equipment development.

The Air Force will also study multiple structural, avionics, and engine modifications that could improve the performance of the aircraft and engines and reduce maintenance man-hours and the logistics footprint of the fleet. Focus of the studies will be on non-mission capable (maintenance) drivers, safety issues, and obsolescence issues through modernization of key components in the airframe, avionics, and engines resulting in improved aircraft availability of a high demand/low density fleet.

Modern communications are key enablers for the B-2. B-2 cryptographic modernization updates cryptographic equipment for B-2 AIT/ARC-234, AN/ARC-211 and MIDS/LVT communication systems. The Adaptive Communication Suite (ACS) explores incremental improvements to the B-2 ACS UHF communication system in order to modernize the system and increase data throughput.

B-2 Armament upgrades integrate new and/or advanced weapons on the B-2 to attack a wider array of target sets, to include hardened, deeply buried targets, as well as destroy more targets per sortie. The Flexible Strike Phase 1 program will re-host the current B-2 stores management software onto a new integrated processor. Integration of the Joint Air-to-Surface Standoff Missile Extended Range (JASSM-ER) weapon will further enhance the B-2's ability to attack and destroy high value target sets. The Expanded Strike program adds the Advanced 5,000 pound Joint Direct Attack Munition (A5K JDAM) and Hard Target Void Sensing Fuze (HTVSF) to the B-2 arsenal providing additional armament capability for hardened, deeply buried targets.

The Low Observable Signature and Supportability Modifications (LOSSM) program supports the B-2 ability to penetrate anti-access combat environments, performing missions directed by the National Command Authority while ensuring aircrew survivability. The LOSSM program reduces low observable (LO) maintenance, and stabilizes and improves the combat-ready LO signature for the B-2 fleet. This program encompasses multiple improvement projects including, but not limited to, improved LO materials (electrically conductive materials, adhesives, electrically resistive materials, radar absorbing material, fastener fills, coatings, welds, material removal tools, and improved processes), LO structures (radar radomes, antennas, hot trailing edges and tiles, intermediate section doors, tailpipes, windows, lib bay panels, leading edge, permanent fasteners, exhaust pockets, gust load alleviation system, inlets, radar absorbing structures, overall signature stability, and Alternate High Frequency Material expansion), and radio frequency (RF) diagnostic tools, evaluation systems, and other tools (Tier One Material Inspection System, Signature

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Diagnostic System, next generation Tier II and Tier III systems, Test Article 0998 optimization, conductivity probes, tailpipe inspection tools, LO-related special test equipment, data archival, and communications tools).							
The B-2 Crash Survivable Memory Unit (CSMU) provides a more capable Flight Data Recorder (FDR) with increased capacity for storing Flight Information Data (FID) for recovery and use in the event of a mishap. The initiative includes replacement of the current CSMU with an adapted Commercial Off the Shelf (COTS) replacement, modification of the Flight Data Recorder Processor (FDRP) to provide 28 vdc power to the new CSMU, modification of the FDRP Operational Flight Program (OFP), and addition of a Underwater Locator Beacon (ULB). The current CSMU/FDRP does not meet the minimum requirements specified in the Aircraft Information Program (AIP) reference documents (AFI 63-133 and AFH 63-1402).							
The B-2 Identification Friend or Foe (IFF) Mode 5/S modification upgrades equipment on the B-2 in order to ensure compliance in the global airspace. Mode 5 provides improved combat identification security, with better discrimination between closely spaced platforms, while reducing interference with civil Air Traffic Control transponders, enabling the B-2 fleet to accomplish its anti-access and global strike mission. Mode 5 is the DoD standard for secure combat ID. Mode S is a secondary surveillance radar process that allows selective interrogation of aircraft according to the unique 24-bit address. Mode S provides improved accuracy and altitude resolution and reduced interference from closely spaced aircraft through selective interrogation of assigned transponder addresses.							
The B-2 Training System upgrades include updates to training device hardware and components, simulation software, courseware and academic materials, instructional system design architectures, engineering drawings, and system documentation that is not driven by a funded aircraft modification. Upgrades may include Diminishing Manufacturing Sources efforts to include removal of end-of-life software/hardware within simulator systems and move to a modular, common open system architecture that is sustainable and cyber-resilient. Additional Training System Upgrades may also include efforts to implement requirements and standards defined under the Simulator Common Architecture Requirements and Standards (SCARS) initiative.							
The Radar Aided Targeting System (RATS) is planned to be a software only solution implemented in several B-2 system level Operational Flight Programs (OFPs) to provide radar-aided enhanced targeting capability through weapon hand-off navigational updates for guided nuclear weapons in a non-GPS environment. Funding supports timely software development, test and roll-out of software into a future B-2 OFP, specifically to support the B61-12 integration.							
Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.							
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: B-2 Flexible Strike Phase 1			0.494	0.000	0.000	0.000	0.000
Description: Rehost the currently separate Stores Management Operational Flight Programs onto the new integrated processor unit made available by the B-2 EHF Increment 1 program.							
FY 2019 Plans:							

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A						
FY 2020 Base Plans:						
N/A						
FY 2020 OCO Plans:						
N/A						
FY 2019 to FY 2020 Increase/Decrease Statement:						
N/A						
Title: Low Observable Signature and Supportability Mods and Trainers		18.972	19.521	18.831	-	18.831
Description: B-2 Low Observable Signature and Supportability Modifications (LOSSM) pursues multiple low-cost development efforts for Low Observable (LO) materials, diagnostics and procedures to enhance LO signature and/or improve aircraft supportability, as well as other development or study efforts for training system improvements.						
FY 2019 Plans:						
Continue development of on-going LOSSM and Training System core upgrades. Accelerate development efforts for Advanced Signature Reduction efforts, the Next Generation Zonal Radar, an abrasion resistant coating, an upgrade to the Tier One Material Inspection System (TOMIS), tailpipe testing, and Signature Diagnostic System Spiral 11. Continues development efforts for advanced LO materials, structures, procedures, and other enhanced diagnostics and measurement systems.						
\$13M of FY19 funding for LOSSM is misaligned into BPAC 676022 AEHF SATCOM, due to a database error.						
FY 2020 Base Plans:						
Continue development of on-going LOSSM and Training System core upgrades. Continue development efforts for advanced LO materials, structures, procedures, and other enhanced diagnostics and measurement systems. Continue development efforts for Advanced Signature Reduction efforts, the Next Generation Zonal Radar, an Abrasion Resistant Coating, an upgrade to the Tier One Material Inspection System, Tailpipe Improvement analysis, and Test Article 0998. Complete production qualification of PE-4, a more durable hot trailing edge material. Mature the Radar Radome Design and begin Signature Diagnostic System Spiral 12.						
FY 2019 to FY 2020 Increase/Decrease Statement:						

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
LOSSM funding increased from FY18 to FY19 as the majority of the development effort is in FY19. The funding decreased in FY20 due to decreased scope of work across the LOSSM portfolio.						
Title: B-2 Joint Air-to-Surface Standoff Missile - Extended Range (JASSM-ER) Integration Description: Integrates the Joint Air to Surface Standoff Missile, Extended Range weapon (JASSM-ER) onto the B-2. FY 2019 Plans: Complete Requirements Maturation (RM) effort and begin EMD activities to include design finalization for Critical Design Review (CDR) and Tech Order generation. FY 2020 Base Plans: Continue executing EMD activities to include CDR as well as conducting Test Readiness Review (TRR) and Flight Readiness Review (FRR). Begin developmental/operational testing (DT/OT). FY 2019 to FY 2020 Increase/Decrease Statement: Funding increases from FY 2019 to FY 2020 due to increase in development activities and execution of CDR, TRR, and FRR.		9.406	12.220	25.316	-	25.316
Title: B-2 Cryptographic Modernization Description: Provides NSA-mandated cryptographic modifications to three communication system components on the aircraft: Advanced Integrated Terminal (AIT) also known as AN/ARC-234 (UHF/VHF Radio), AN/ARC-211 (HF Radio), and the Multifunction Information Distribution System (MIDS) Low Volume Terminal (Link-16 Terminal). FY 2019 Plans: N/A FY 2020 Base Plans: N/A		18.633	0.000	0.000	-	0.000
Title: B-2 Adaptable Communications Suite (ACS) Description: The Adaptable Communications Suite provides a non-integrated avionics and communications system that allows the B-2 fleet to receive mission data, time sensitive targeting information, intelligence and weather updates, positive command and control procedures, and perform operational reconnaissance. FY 2019 Plans:		0.026	1.428	0.197	-	0.197

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Conduct acquisition planning, risk reduction, and requirements maturation for a modernized ACS system. The modernized system will include new radios with MUOS capability replacing the existing radios and revised software which will integrate a permanent BLOS communications capability to ensure continued UHF connectivity for integrated mission data, time sensitive targeting information, intelligence and weather updates, positive command and control capability, and perform operational reconnaissance.</p> <p>FY 2020 Base Plans: Continue risk reduction activities for a modernized ACS system.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Reduction in funding from FY19 to FY20 as risk reduction effort concludes.</p>					
<p>Title: B-2 Identification Friend or Foe (IFF) Mode 5/S Program</p> <p>Description: B-2 IFF Mode 5/S provides improved combat identification security enabling the B-2 fleet to accomplish its anti-access and global strike mission. Mode S provides improved accuracy, altitude resolution, and reduced interference from closely spaced aircraft through interrogation of assigned transponder addresses.</p> <p>FY 2019 Plans: Complete Milestone B Decision and award Engineering & Manufacturing Development (EMD) delivery order.</p> <p>FY 2020 Base Plans: Continue executing EMD activities to include Preliminary Design Review (PDR) and Critical Design Review (CDR).</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: N/A</p>	0.440	16.764	16.754	-	16.754
<p>Title: B-2 Crash Survivable Memory Unit (CSMU)</p> <p>Description: The B-2 Crash Survivable Memory Unit (CSMU) provides a more capable Flight Data Recorder (FDR) with increased capacity for storing Flight Information Data (FID) for recovery and use in the event of a mishap. The initiative includes replacement of the current CSMU with an adapted Commercial Off the Shelf (COTS) replacement, modification of the Flight Data Recorder Processor (FDRP) to provide 28 vdc power to the new CSMU, modification of the FDRP Operational Flight Program (OFP), and addition of a Underwater Locator Beacon (ULB).</p> <p>FY 2019 Plans:</p>	2.046	4.818	1.870	-	1.870

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Perform Non-recurring Engineering (NRE) to adapt Commercial Off the Shelf (COTS) CSMU to the B-2 Flight Data Recorder (FDR) system, modify the FDRP, and update the FDRP OFP. Three prototype CSMUs will be assembled for integration and flight test, and three FDRPs will be modified to operate with the COTS CSMU design. FY 2020 Base Plans: Complete Non-recurring Engineering (NRE) to adapt Commercial Off the Shelf (COTS) CSMU to the B-2 Flight Data Recorder (FDR) system, complete modification of the FDRP, and update the FDRP OFP. FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreases from FY 2019 to FY 2020 due to decrease in development activities.						
Title: B-2 Radar Aided Targeting System (RATS) Description: The Radar Aided Targeting System (RATS) is planned to be a software only solution implemented in several B-2 system level Operational Flight Programs (OFPs) to provide radar-aided enhanced targeting capability through weapon hand-off navigational updates for Type 2 nuclear weapons in a non-GPS environment. FY 2019 Plans: Radar Aided Targeting System (RATS) is a new start. FY19 activities include EMD activities, including Preliminary Design Review (PDR). FY 2020 Base Plans: Execution of remaining EMD activities to include CDR, at which the contractor is expected to demonstrate Display Control Panel Operational flight Program (DCPOFP) functionality, as well as conducting Test Readiness Review (TRR) and Flight Readiness Review (FRR). DT/OT will be performed at Whiteman AFB and initiated during this time. FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreases from FY 2019 to FY 2020 as development activities decrease.		0.000	23.668	18.957	-	18.957
Title: B-2 Expanded Strike Description: The Expanded Strike program adds the Advanced 5,000 pound Joint Direct Attack Munition (A5K JDAM) and Hard Target Void Sensing Fuze (HTVSF) to the B-2 arsenal providing additional armament capability for hardened, deeply buried targets. FY 2019 Plans:		-	0.000	1.000	-	1.000

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Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons				Project (Number/Name) 675345 / B-2 Modernization				
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A - FY 2020 New Start													
FY 2020 Base Plans: Conduct acquisition planning, affordability assessments, and other pre-EMD activities.													
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 New Start													
Accomplishments/Planned Programs Subtotals									50.017	78.419	82.925	0.000	82.925
C. Other Program Funding Summary (\$ in Millions)													
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost		
• APAF 05 Line Item B00200: B-2 Training Support Modification, PE 0809731F	9.082	7.800	0.000	-	0.000	8.080	8.242	8.392	16.481	Continuing	Continuing		
• APAF 05 Line Item B00200 (1)....: B-2 Flexible Strike Mod Funding, PE 0101127F	5.629	7.959	4.894	-	4.894	-	-	-	-	0.000	18.482		
• APAF 05 Line Item B00200 (2)....: B-2 LOSSM Mod Funding, PE 0101127F	5.890	14.831	0.276	-	0.276	19.878	24.009	26.244	21.017	Continuing	Continuing		
• APAF 05 Line Item B00200 (3)....: B-2 CSMU Mod Funding, PE 0101127F	-	-	-	-	-	3.273	1.601	1.631	1.660	Continuing	Continuing		
• APAF 05 Line Item B00200 (4)....: B-2 IFF Mode 5/S Mod Funding, PE 0101127F	-	-	-	-	-	7.239	15.420	15.894	97.723	Continuing	Continuing		
• APAF 05 Line Item B00200 (5)....: B-2 B61-12 Integration Mod	39.549	-	-	-	-	-	-	-	-	0.000	39.549		
• APAF 05 Line Item B00200 (6)....: B-2 MGUE Mod	15.625	1.281	0.990	-	0.990	-	0.320	0.480	-	0.000	18.696		
Remarks													

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D. Acquisition Strategy Key elements of the overall acquisition strategy include: use of sole source contract with a prime/integrating contractor (Northrop Grumman), employ the program office as the system integrator when practical, leverage mature technology and systems development investments by other Department of Defense organizations, encourage prime contractor competition of subsystems and key components to reduce risk and cost, use of cost plus incentive fee (CPIF) development contracts, and combine developmental upgrades with software sustainment blocks to minimize the number of software releases, aircraft downtime, and differences in fielded configurations.		
E. 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 2020 Air Force **Date:** February 2019

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
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Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
B-2 Flex Strike Phase 1	Various	Various : Various	0.000	0.381	Dec 2017	-		-		-		-	0.000	0.381	-
Low Observable Signature and Supportability Mods	Various	Various : Various	0.000	17.272	Dec 2017	16.578	Nov 2018	16.876	Oct 2019	-		16.876	Continuing	Continuing	-
B-2 Joint Air-to-Surface Standoff Missile - Extended Range (JASSM-ER) Integration	Various	Various : Various	0.000	7.679	Dec 2018	8.673	Jan 2019	20.745	Oct 2019	-		20.745	0.000	37.097	-
B-2 Cryptographic Modernization	Various	Various : Various	0.000	18.225	Dec 2018	-		-		-		-	0.000	18.225	-
B-2 Adaptable Communications Suite (ACS)	Various	Various : Various	0.000	0.015	Dec 2017	1.412	Dec 2018	0.179	Dec 2019	-		0.179	Continuing	Continuing	-
B-2 IFF Mode 5/S	Various	Various : Various	0.000	0.000		14.739	Jun 2019	12.772	Jun 2020	-		12.772	Continuing	Continuing	-
B-2 Crash Survivable Memory Unit (CSMU)	Various	Various : Various	0.000	1.892	Jul 2019	4.166	Jul 2019	1.403	Jul 2020	-		1.403	4.713	12.174	-
B-2 RATS	Various	Various : Various	0.000	-		19.244	Oct 2018	8.939	Oct 2019	-		8.939	0.000	28.183	-
B-2 Expanded Strike	Various	Various : Various	0.000	-		-		0.914	Dec 2019	-		0.914	0.000	0.914	-
Aircrew Training	Various	Various : Various	0.000	0.086	Dec 2017	1.091	Dec 2018	6.318	Dec 2019	-		6.318	Continuing	Continuing	-
Mission Planning	Various	Various : Various	0.000	0.430	Jan 2018	1.100	Jan 2019	5.272	Jan 2020	-		5.272	Continuing	Continuing	-
Subtotal			0.000	45.980		67.003		73.418		-		73.418	Continuing	Continuing	N/A

Remarks

Northrop-Grumman is the prime contractor and serves as integrator and hence main contractor for many (ie "Various"), but not all, B-2 modernization efforts.

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Government Test	MIPR	Various : CA	0.000	0.663	Nov 2017	3.525	Nov 2018	1.321	Dec 2019	-		1.321	Continuing	Continuing	-
Subtotal			0.000	0.663		3.525		1.321		-		1.321	Continuing	Continuing	N/A

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Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons				Project (Number/Name) 675345 / B-2 Modernization					
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
PMA	Various	Various : TBD	0.000	3.374	Oct 2017	7.891	Oct 2018	8.186	Oct 2019	-		8.186	Continuing	Continuing	-
Subtotal			0.000	3.374		7.891		8.186		-		8.186	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	50.017		78.419		82.925		-		82.925	Continuing	Continuing	N/A
Remarks															
Award dates listed are the first incremental funding opportunity associated with each cost category.															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force	Date: February 2019
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>	Project (Number/Name) 675345 / <i>B-2 Modernization</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>B-2 Modifications Schedule</i>																												
Flexible Strike EMD																												
Flexible Strike Ph 1 Milestone C																												
Flexible Strike Ph 1 Production Contract Award																												
Flexible Strike Production																												
Flexible Strike Ph 1 Required Assets Available																												
Low Observable Signature and Supportability Mods and Trainers																												
JASSM-ER Integration Preliminary Design																												
JASSM-ER Integration Milestone B																												
Crypto Modification Contract Award																												
IFF Mode 5/S Milestone B																												
IFF Mode 5/S EMD Phase																												
IFF Mode 5/S Milestone C																												
Crash Survivable Memory Unit Milestone B																												
Crash Survivable Memory Unit EMD Contract																												
Crash Survivable Memory Unit Milestone C / Production and Deployment																												
Radar Aided Targeting System (RATS) Software Development and Fielding																												
Expanded Strike Acquisition Planning Contract Award																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>	Project (Number/Name) 675345 / <i>B-2 Modernization</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-2 Modifications Schedule</i>				
Flexible Strike EMD	1	2018	2	2019
Flexible Strike Ph 1 Milestone C	2	2018	2	2018
Flexible Strike Ph 1 Production Contract Award	2	2018	2	2018
Flexible Strike Production	2	2018	4	2021
Flexible Strike Ph 1 Required Assets Available	4	2020	4	2020
Low Observable Signature and Supportability Mods and Trainers	1	2018	4	2024
JASSM-ER Integration Preliminary Design	1	2019	3	2019
JASSM-ER Integration Milestone B	3	2019	3	2019
Crypto Modification Contract Award	1	2019	1	2019
IFF Mode 5/S Milestone B	3	2019	3	2019
IFF Mode 5/S EMD Phase	3	2019	2	2021
IFF Mode 5/S Milestone C	2	2021	2	2021
Crash Survivable Memory Unit Milestone B	3	2019	3	2019
Crash Survivable Memory Unit EMD Contract	4	2019	3	2021
Crash Survivable Memory Unit Milestone C / Production and Deployment	1	2021	4	2024
Radar Aided Targeting System (RATS) Software Development and Fielding	1	2019	1	2021
Expanded Strike Acquisition Planning Contract Award	1	2020	1	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons				Project (Number/Name) 676021 / BASELINE SUPPORT			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
676021: BASELINE SUPPORT	0.000	13.052	14.089	14.351	0.000	14.351	14.599	14.903	15.175	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Baseline Support maintains and upgrades the B-2 unique flight test aircraft as well as hardware/software and test equipment to support developmental systems integration, and flight test, reducing the need for additional operational aircraft and accelerating deployment of advanced operational capabilities to the warfighter. Baseline Support also provides for other B-2 unique government costs and includes assorted studies of aircraft performance and cost trades as well as acquisition planning activities, up to and including proposal preparation, for future aircraft, engine, weapon, communication, navigation or other capabilities.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Baseline Support Acq Plan/Studies/Integr Test Support	0.297	0.297	0.297	-	0.297
Description: Baseline Support provides for other B-2 unique government costs, including acquisition planning activities for future capabilities, long range planning, studies, and program integration activities, as well as integration and test support of upgraded crypto components as needed.					
FY 2019 Plans: Continue Baseline Support activities including acquisition planning for future capabilities, long range planning, studies, program integration activities, integration and test support of upgraded crypto components.					
FY 2020 Base Plans: Continue Baseline Support activities including acquisition planning for future capabilities, long range planning, studies, and program integration activities.					
FY 2019 to FY 2020 Increase/Decrease Statement: No change to Baseline Support/Acq Plan/Integr Test Support funding from FY 2019 to FY 2020					
Title: Baseline Support Flight Test	12.755	13.792	14.054	-	14.054
Description: Description: Baseline Support Flight Test maintains and upgrades the B-2 unique flight test aircraft as well as hardware/software and test equipment to support developmental systems integration and flight test,					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force				Date: February 2019		
Appropriation/Budget Activity 3600 / 7		R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>		Project (Number/Name) 676021 / <i>BASELINE SUPPORT</i>		
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
reducing the need for additional operational aircraft and accelerating deployment of advanced operational capabilities to the warfighter. FY 2019 Plans: Continue B-2 Flight Test activities, maintaining and upgrading the B-2 unique flight test aircraft as well as hardware/software and test equipment, to support developmental systems integration and flight test, and test aircraft de-mod efforts. FY 2020 Base Plans: Continue B-2 Flight Test activities, maintaining and upgrading the B-2 unique flight test aircraft as well as hardware/software and test equipment, to support developmental systems integration and flight test. FY 2019 to FY 2020 Increase/Decrease Statement: No significant change to Baseline Support Flight Test funding from FY 2019 to FY 2020.						
Accomplishments/Planned Programs Subtotals		13.052	14.089	14.351	-	14.351
C. Other Program Funding Summary (\$ in Millions)						
N/A						
Remarks						
D. Acquisition Strategy						
Key elements of the overall acquisition strategy include: use of a sole source contract with a prime/integrating contractor (Northrop Grumman) for most but not all B-2 programs; use of cost plus incentive fee (CPIF) development contracts; and the combination of developmental upgrades with software sustainment blocks to minimize the number of software releases, aircraft downtime, and differences in fielded configurations.						
E. 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 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons				Project (Number/Name) 676021 / BASELINE SUPPORT					
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Other Government Costs	Various	Various : Various	0.000	9.004	Oct 2017	9.658	Oct 2018	9.378	Oct 2019	-		9.378	Continuing	Continuing	-
Subtotal			0.000	9.004		9.658		9.378		-		9.378	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Government Test	MIPR	AFTC : CA	0.000	3.200	Oct 2017	3.268	Oct 2018	3.597	Oct 2019	-		3.597	Continuing	Continuing	-
Subtotal			0.000	3.200		3.268		3.597		-		3.597	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
PMA	Various	Various : TBD	0.000	0.848	Oct 2017	1.163	Oct 2018	1.376	Oct 2019	-		1.376	Continuing	Continuing	-
Subtotal			0.000	0.848		1.163		1.376		-		1.376	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	13.052		14.089		14.351		-		14.351	Continuing	Continuing	N/A
Remarks Award dates listed are the first incremental funding opportunity associated with each cost category.															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force	Date: February 2019
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Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>	Project (Number/Name) 676021 / <i>BASELINE SUPPORT</i>
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	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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>B-2 Baseline Support</i>																												
FY18 Flight Test Core Support Contract Award	■																											
FY19 Flight Test Core Support Contract Award					■																							
FY20 Flight Test Core Support Contract Award									■																			
FY21 Flight Test Core Support Contract Award												■																
FY22 Flight Test Core Support Contract Award																■												
FY23 Flight Test Core Support Contract Award																				■								
FY24 Flight Test Core Support Contract Award																									■			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>	Project (Number/Name) 676021 / <i>BASELINE SUPPORT</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-2 Baseline Support</i>				
FY18 Flight Test Core Support Contract Award	1	2018	1	2018
FY19 Flight Test Core Support Contract Award	1	2019	1	2019
FY20 Flight Test Core Support Contract Award	1	2020	1	2020
FY21 Flight Test Core Support Contract Award	1	2021	1	2021
FY22 Flight Test Core Support Contract Award	1	2022	1	2022
FY23 Flight Test Core Support Contract Award	1	2023	1	2023
FY24 Flight Test Core Support Contract Award	1	2024	1	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity 3600 / 7					R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons				Project (Number/Name) 676022 / AEHF Strategic Comm			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
676022: AEHF Strategic Comm	0.000	26.712	13.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	39.712
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note FY18 funding does not reflect the \$13M rescission due to a technical error. \$13M of FY19 funding for LOSSM is misaligned into BPAC 676022 AEHF SATCOM, due to a database error. A. Mission Description and Budget Item Justification The B-2 Advanced Extremely High Frequency (AEHF) Satellite Communications (SATCOM) system provides secure, strategic, two-way, survivable Anti-Access/Area Denial communications capability for conventional and nuclear missions. The effort was established in Project 675345 B-2 Modernization; the B-2 AEHF effort continued in FY 2017 and subsequent years under Project 676022 AEHF Strategic Comm. The AEHF SATCOM program was terminated in the FY 2019 Budget. \$13M of FY19 funding for LOSSM is misaligned into BPAC 676022 AEHF SATCOM, due to a database error. B. Accomplishments/Planned Programs (\$ in Millions)												
								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: B-2 AEHF (Strategic Communication)								26.712	13.000	0.000	-	0.000
Description: B-2 AEHF (Strategic Communication) provides secure, strategic, two-way, survivable Anti-Access/ Area Denial communications capability for conventional and nuclear missions.												
FY 2019 Plans: B-2 EHF SATCOM program was terminated in FY 2019 Budget.												
FY 2020 Base Plans: N/A												
FY 2019 to FY 2020 Increase/Decrease Statement: B-2 EHF SATCOM program was terminated in FY 2019 Budget.												
Accomplishments/Planned Programs Subtotals								26.712	13.000	0.000	-	0.000
C. Other Program Funding Summary (\$ in Millions) N/A												
Remarks FY18 funding does not reflect the \$13M rescission due to a technical error.												

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 676022 / AEHF Strategic Comm
D. Acquisition Strategy N/A		
E. 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 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 7						R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons						Project (Number/Name) 676022 / AEHF Strategic Comm			
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
AEHF Strategic Comm	Various	Not specified. : TBD	0.000	22.936		13.000		-		-		-	0.000	35.936	-
Subtotal			0.000	22.936		13.000		-		-		-	0.000	35.936	N/A
Remarks Northrop-Grumman is the prime contractor and lead integrator.															
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
PMA	Various	Various : TBD	0.000	3.776	Jan 2018	-		-		-		-	Continuing	Continuing	0.000
Subtotal			0.000	3.776		-		-		-		-	Continuing	Continuing	N/A
			Prior Years	FY 2018	FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals			0.000	26.712		13.000		-		-		-	Continuing	Continuing	N/A
Remarks Award dates listed are the first incremental funding opportunity associated with each cost category.															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force						Date: February 2019					
Appropriation/Budget Activity						R-1 Program Element (Number/Name)					
3600 / 7						PE 0101127F / B-2 Squadrons					
						Project (Number/Name)					
						676022 / AEHF Strategic Comm					

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Program Terminated																												
Termination																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force		Date: February 2019
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 676022 / AEHF Strategic Comm

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Program Terminated				
Termination	1	2019	1	2019

Note
Program was terminated in the FY 2019 Budget. No events are planned.