

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons
--	---

COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	101.827	93.076	187.399	0.000	187.399	173.200	85.084	13.902	7.228	Continuing	Continuing
675345: <i>B-2 Modernization</i>	0.000	93.076	78.725	172.827	0.000	172.827	158.320	69.937	13.902	7.228	Continuing	Continuing
676021: <i>BASELINE SUPPORT</i>	0.000	8.751	14.351	14.572	0.000	14.572	14.880	15.147	0.000	0.000	Continuing	Continuing

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) is a non-integrated system that provides SATCOM connectivity for Command and Control enroute to the target. A critical capability is the ability to receive Airborne Mission Transfer (AMT) and Beyond Line-of-Sight Situational Awareness. This effort includes improvements to the suite of B-2 ACS UHF communications system in order to become part of the baseline configuration, as well as modernization upgrades to conform to mandates.

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. Integration of the Joint Air-to-Surface Missile Extended Range (JASSM-ER) weapon will further enhance the B-2s ability to attack and destroy high value target sets.

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.

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.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101127F / <i>B-2 Squadrons</i>	
<p>The B-2 Identification Friend or Foe (IFF) Mode 5/S modification program replaces the current IFF transponder with a new Mode 5 and Mode S capable transponder ensuring compliance with DoD Combat Identification mandates and global Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) requirements. Mode 5 is the DoD standard for secure combat identification and provides improved 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 replaced the obsolete Mode 4 combat identification. Mode S is a civil air traffic control 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.</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>In FY 2020 and prior, the B-2 DMS-M effort is documented in PE 0605931F B-2 DMS, Project 653844 B-2 DMS; beginning in FY 2021, this effort is documented in PE 0101127F B-2 Squadrons, Project 675345 B-2 Modernization.</p> <p>The FY 2021 budget reflects a significant restructure of the B-2 DMS-M program that reduces the program scope to modernize the B-2 display functionality including the multi-function display units (MDUs) and Advanced Graphics Processor (AGP) of the baselined DMS-M program. The legacy display sub-system lacks the processing power to provide necessary situation awareness. In addition, the legacy MDUs are not supportable due to obsolescence and repair issues which will severely impact future aircraft availability.</p> <p>During B-2 DMS-M Displays development, the engineering baseline will be finalized and production representative kits will be purchased to support software development, platform integration, integrated development/operational test, pre-Milestone C production assessment, and B-2 nuclear certification testing. Diminishing manufacturing sources and materiel shortages for affected components will be addressed to protect the planned production program by mitigating unplanned part redesign and requalification risks. This effort will also require investment in systems engineering and software development to integrate the AGP into the B-2 current architecture that includes the legacy Threat Emitter Locator system and associated displays. The program will ensure the most efficient restructure minimizing rework from the baseline DMS-M program.</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 element 0605831F.</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>		

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons
--	---

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	105.508	97.276	48.827	0.000	48.827
Current President's Budget	101.827	93.076	187.399	0.000	187.399
Total Adjustments	-3.681	-4.200	138.572	0.000	138.572
• Congressional General Reductions	-0.087	0.000			
• Congressional Directed Reductions	0.000	-9.200			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.594	0.000			
• Other Adjustments	0.000	0.000	138.572	0.000	138.572

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

Project: 675345: *B-2 Modernization*

Congressional Add: *B-2 Trainers Modernization*

	FY 2019	FY 2020
Congressional Add Subtotals for Project: 675345	-	5.000
Congressional Add Totals for all Projects	-	5.000

Change Summary Explanation

FY 2019: Reductions for SBIR \$3.594M, MDAP Penalty \$0.032M, and FFRDC \$0.055M.

FY 2020: B-2 IFF Mode 5/S reduction of \$9.2M due to Congressional mark citing Airspace compliance schedule delays; Congressional add of \$5.0M for B-2 Trainers Modernization.

FY 2021: Reduction of \$16.148M for higher Air Force priorities; Increase (\$155M) for restructure of current DMS-M EMD effort to a Multi-Function Display Unit Replacement (MDU-R)/Advanced Graphics Processor (AGP) development effort previously residing in PE 0605931F.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
675345: B-2 Modernization	0.000	93.076	78.725	172.827	0.000	172.827	158.320	69.937	13.902	7.228	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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. The Adaptive Communication Suite (ACS) provides baseline improvements to the B-2 ACS UHF SATCOM communication system in order to modernize the system and increase data throughput to support key mission enablers such as AMT, weather, and intelligence updates.

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. 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 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 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).

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
---	----------------------------

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>
--	--	---

The B-2 Identification Friend or Foe (IFF) Mode 5/S modification replaces the current IFF transponder with a new Mode 5 and Mode S capable transponder ensuring compliance with DoD Combat Identification mandates and global Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) requirements. Mode 5 is the DoD standard for secure combat identification and provides improved 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 replaced the obsolete Mode 4 combat identification. Mode S is a civil air traffic control 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.

In FY 2020 and prior, the B-2 DMS-M effort is documented in PE 0605931F B-2 DMS, Project 653844 B-2 DMS; beginning in FY 2021, this effort is documented in PE 0101127F B-2 Squadrons, Project 675345 B-2 Modernization.

The FY 2021 budget reflects a significant restructure of the B-2 DMS-M program that reduces the program scope to modernize the B-2 display functionality including the multi-function display units (MDUs) and Advanced Graphics Processor (AGP) of the baselined DMS-M program. The legacy display sub-system lacks the processing power to provide necessary situation awareness. In addition, the legacy MDUs are not supportable due to obsolescence and repair issues which will severely impact future aircraft availability.

During B-2 DMS-M Displays development, the engineering baseline will be finalized and production representative kits will be purchased to support software development, platform integration, integrated development/operational test, pre-Milestone C production assessment, and B-2 nuclear certification testing. Diminishing manufacturing sources and materiel shortages for affected components will be addressed to protect the planned production program by mitigating unplanned part redesign and requalification risks. This effort will also require investment in systems engineering and software development to integrate the AGP into the B-2 current architecture that includes the legacy Threat Emitter Locator system and associated displays. The program will ensure the most efficient restructure minimizing rework from the baseline DMS-M program.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
---	----------------------------

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
--	---	--

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.

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, 0605898F, and 0605833F.

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

	FY 2019	FY 2020	FY 2021
<p>Title: Low Observable Signature and Supportability Mods and Trainers</p> <p>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.</p> <p>FY 2020 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. Begin Signature Diagnostic System Spiral 12.</p> <p>FY 2021 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. Continue Signature Diagnostic System Spiral 12.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.</p>	28.406	18.831	10.733
<p>Title: B-2 Joint Air-to-Surface Standoff Missile - Extended Range (JASSM-ER) Integration</p> <p>Description: Integrates the Joint Air to Surface Standoff Missile, Extended Range weapon (JASSM-ER) onto the B-2.</p> <p>FY 2020 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).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	10.380	25.316	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
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 2019	FY 2020	FY 2021
Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.				
<p>Title: B-2 Adaptable Communications Suite (ACS)</p> <p>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.</p> <p>FY 2020 Plans: Continue 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 2021 Plans: Continue acquisition planning, risk reduction, and requirements maturation for a modernized ACS system. Begin system development for modernized ACS system (ACS Increment 4.0) and purchase test assets.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>		4.859	0.197	0.200
<p>Title: B-2 Identification Friend or Foe (IFF) Mode 5/S Program</p> <p>Description: The B-2 IFF Mode 5/S replaces the current IFF transponder with a new Mode 5 and Mode S capable IFF transponder ensuring compliance with DoD/NATO Combat Identification mandates (Mode 5) and global Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) requirements (Mode S). Mode 5 provides improved combat identification security and accuracy 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 2020 Plans: Execute EMD activities to include System Requirements Review, System Functional Review, Preliminary Design Review, and integration of new transponder hardware into the B-2 Weapon System Support Center (WSSC) for software development.</p> <p>FY 2021 Plans: Execute EMD activities to include Critical Design Review, software integration testing in the WSSC, Test Readiness Review, Flight Readiness Review, and initiation of combined development and operational testing at Whiteman AFB.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>		15.651	7.554	6.028

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020		
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 2019	FY 2020	FY 2021
Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.				
<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 2020 Plans: 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.</p> <p>FY 2021 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.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.</p>		10.296	1.870	1.098
<p>Title: B-2 Radar Aided Targeting System (RATS)</p> <p>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 System 2 nuclear weapons in a non-GPS environment.</p> <p>FY 2020 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.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreases from FY 2020 to FY 2021 due to decrease in development activities.</p>		23.484	18.957	-
<p>Title: B-2 Defensive Management System/Displays</p> <p>Description: B-2 DMS-M Displays program is a modernization of the multi-function display units (MDUs) and Advanced Graphics Processor (AGP). This is not a new start. Prior years DMA efforts were in PE65931F.</p>		-	0.000	154.768

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
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 2019	FY 2020	FY 2021
<p>FY 2020 Plans: N/A - In PE 0605931F</p> <p>FY 2021 Plans: Continue modification of A/C 1087 and development labs to support restructured program. Continue development and software integration of MDUs and AGPs. Continue MDU obsolescence refresh. Conduct appropriate systems engineering and design reviews to support restructured program.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Transitioned to PE 0101127F</p>			
<p>Title: B-2 Expanded Strike</p> <p>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.</p> <p>FY 2020 Plans: Conduct acquisition planning, affordability assessments, and other pre-EMD activities.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Expanded Strike program terminated in FY 2021 Budget. No events are planned.</p>	0.000	1.000	-
Accomplishments/Planned Programs Subtotals	93.076	73.725	172.827

	FY 2019	FY 2020
Congressional Add: B-2 Trainers Modernization	-	5.000
FY 2020 Plans: Develop plan to execute FY 2020 Congressional add for B-2 Trainers Modernization efforts.		
Congressional Adds Subtotals	-	5.000

C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• APAF 05 Line Item B00200: B-2 LOSSM Mod Funding, PE 0101127F	15.218	0.276	19.851	-	19.851	24.003	26.210	20.991	11.743	Continuing	Continuing

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
--	---	--

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item B00200 (1)...: B-2 CSMU Mod Funding, PE 0101127F	-	-	-	-	-	1.599	1.628	1.657	1.688	Continuing	Continuing
• APAF 05 Line Item B00200 (2)...: B-2 IFF Mode 5/S Mod Funding, PE 0101127F	-	-	-	-	-	15.405	15.873	10.490	-	Continuing	Continuing
• APAF 05 B2DMS0: B-2 DMS	-	-	-	-	-	-	132.069	111.294	27.573	Continuing	Continuing

Remarks

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.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
--	---	--

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Low Observable Signature and Supportability Mods	Various	Various : Various	0.000	25.634	Nov 2018	16.525	Oct 2019	10.101	Oct 2020	-		10.101	Continuing	Continuing	-
B-2 Joint Air-to-Surface Standoff Missile - Extended Range (JASSM-ER) Integration	Various	Various : Various	0.000	3.895	Jan 2019	23.993	Oct 2019	-		-		-	0.000	27.888	-
B-2 Adaptable Communications Suite (ACS)	Various	Various : Various	0.000	5.058	Dec 2018	0.167	Dec 2019	0.195	Dec 2020	-		0.195	Continuing	Continuing	-
B-2 IFF Mode 5/S	Various	Various : Various	0.000	16.400	Sep 2019	4.668	Nov 2019	5.606	Nov 2020	-		5.606	Continuing	Continuing	-
B-2 Crash Survivable Memory Unit (CSMU)	Various	Various : Various	0.000	9.503	Jan 2020	1.430	Jun 2020	0.926	Dec 2020	-		0.926	4.713	16.572	-
B-2 RATS	Various	Various : Various	0.000	18.979	Oct 2018	10.845	Oct 2019	-		-		-	0.000	29.824	-
B-2 Defensive Management System	Various	Various : Various	0.000	0.000		-		134.305	Dec 2020	-		134.305	128.685	262.990	-
Aircrew Training	Various	Various : Various	0.000	1.091	Dec 2018	6.318	Dec 2019	-		-		-	Continuing	Continuing	-
Mission Planning	Various	Various : Various	0.000	1.100	Jan 2019	5.272	Jan 2020	-		-		-	Continuing	Continuing	-
Subtotal			0.000	81.660		69.218		151.133		-		151.133	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 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Government Test	MIPR	Various : CA	0.000	3.525	Nov 2018	1.321	Dec 2019	9.377		-		9.377	Continuing	Continuing	-
Subtotal			0.000	3.525		1.321		9.377		-		9.377	Continuing	Continuing	N/A

Remarks
B-2 DMS transitioned to PE 0101127F in FY 2021

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

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 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-	
PMA	Various	Various : TBD	0.000	7.891	Oct 2018	8.186	Oct 2019	12.317	Oct 2020	-		12.317	Continuing	Continuing	-	
Subtotal			0.000	7.891		8.186		12.317		-		12.317	Continuing	Continuing	N/A	
Project Cost Totals			0.000	93.076		78.725		172.827		-		172.827	Continuing	Continuing	N/A	

Remarks
Award dates listed are the first incremental funding opportunity associated with each cost category.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
--	---	--

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
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

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
B-2 Modifications Schedule																												
Low Observable Signature and Supportability Mods and Trainers																												
JASSM-ER Integration Preliminary Design																												
JASSM-ER Integration Milestone B																												
JASSM-ER Integration EMD Phase																												
IFF Mode 5/S Milestone B																												
IFF Mode 5/S EMD Phase																												
IFF Mode 5/S Milestone C / Production and Deployment																												
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) Milestone B																												
Radar Aided Targeting System (RATS) Software Development and Fielding																												
B-2 DMS-M Displays Acquisition Planning & Transition																												
B-2 DMS-M Displays EMD Phase																												
B-2 DMS-M Displays Milestone C																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 675345 / B-2 Modernization
--	---	--

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-2 Modifications Schedule</i>				
Low Observable Signature and Supportability Mods and Trainers	1	2019	4	2025
JASSM-ER Integration Preliminary Design	1	2019	4	2019
JASSM-ER Integration Milestone B	4	2019	4	2019
JASSM-ER Integration EMD Phase	4	2019	3	2021
IFF Mode 5/S Milestone B	4	2019	4	2019
IFF Mode 5/S EMD Phase	4	2019	2	2022
IFF Mode 5/S Milestone C / Production and Deployment	2	2022	4	2024
Crash Survivable Memory Unit Milestone B	2	2020	2	2020
Crash Survivable Memory Unit EMD Contract	2	2020	3	2022
Crash Survivable Memory Unit Milestone C / Production and Deployment	3	2022	4	2025
Radar Aided Targeting System (RATS) Milestone B	4	2019	4	2019
Radar Aided Targeting System (RATS) Software Development and Fielding	1	2019	4	2021
B-2 DMS-M Displays Acquisition Planning & Transition	2	2020	1	2021
B-2 DMS-M Displays EMD Phase	1	2021	4	2023
B-2 DMS-M Displays Milestone C	2	2023	2	2023

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force										Date: February 2020		
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
676021: BASELINE SUPPORT	0.000	8.751	14.351	14.572	0.000	14.572	14.880	15.147	0.000	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 2019	FY 2020	FY 2021
<p>Title: Baseline Support Acq Plan/Studies/Integr Test Support</p> <p>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.</p> <p>FY 2020 Plans: Continue Baseline Support activities including acquisition planning for future capabilities, long range planning, studies, and program integration activities.</p> <p>FY 2021 Plans: Continue Baseline Support activities including acquisition planning for future capabilities, long range planning, studies, and program integration activities.</p>	0.297	0.297	0.297
<p>Title: Baseline Support Flight Test</p> <p>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, reducing the need for additional operational aircraft and accelerating deployment of advanced operational capabilities to the warfighter.</p> <p>FY 2020 Plans:</p>	8.454	14.054	14.275

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force	Date: February 2020
---	----------------------------

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 676021 / BASELINE SUPPORT
--	---	---

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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.			
<i>FY 2021 Plans:</i> 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.			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> N/A			
Accomplishments/Planned Programs Subtotals	8.751	14.351	14.572

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.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force **Date:** February 2020

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 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	0.000	5.562	Oct 2018	10.225	Oct 2019	10.019	Oct 2020	-		10.019	Continuing	Continuing	-
Subtotal			0.000	5.562		10.225		10.019		-		10.019	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Government Test	MIPR	AFTC : CA	0.000	2.026	Oct 2018	2.750	Oct 2019	2.716	Oct 2020	-		2.716	Continuing	Continuing	-
Subtotal			0.000	2.026		2.750		2.716		-		2.716	Continuing	Continuing	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
PMA	Various	Various : TBD	0.000	1.163	Oct 2018	1.376	Oct 2019	1.837	Oct 2020	-		1.837	Continuing	Continuing	-
Subtotal			0.000	1.163		1.376		1.837		-		1.837	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	8.751	14.351	14.572	-	14.572	Continuing	Continuing	N/A

Remarks
Award dates listed are the first incremental funding opportunity associated with each cost category.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force **Date:** February 2020

Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0101127F / B-2 Squadrons	Project (Number/Name) 676021 / BASELINE SUPPORT
--	---	---

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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

B-2 Baseline Support																																								
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																					■																			
FY25 Flight Test Core Support Contract Award																									■															

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force **Date:** February 2020

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>				
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
FY25 Flight Test Core Support Contract Award	1	2025	1	2025