Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force	Date: March 2023
Appropriation/Budget Activity 3600: *Research, Development, Test & Evaluation, Air Force* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0207138F / *F-22A Squadrons*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	0.000	626.329	559.709	725.889	0.000	725.889	682.082	646.849	473.498	581.822	0.000	4,296.178
674785: *F-22*	0.000	626.329	559.709	725.889	0.000	725.889	682.082	646.849	473.498	581.822	0.000	4,296.178
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The F-22 Raptor is a multi-mission fighter aircraft that combines low observability, supercruise, maneuverability and integrated avionics to make it the world's most capable air superiority aircraft. The F-22 provides air superiority to the Joint Force, access in highly contested operational environments, as well as homeland and cruise missile defense into the 2040s. To maintain mission effectiveness, the program is continuing planned, incremental modernization efforts that enhance both F-22 Air Superiority and Global Strike capabilities. The F-22 modernization program upgrades the air vehicle, engine, and training systems to improve F-22 weapons, communications, navigation, pilot systems, and electronic warfare.

Technology development and Modernization for the F-22 Raptor is conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled delivery cadence for capabilities as they mature.

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 element 0605827F, 0605828F, 0605829F, 0605831F, 0605832F, 0605833F, 0605898F, 0606398F. In FY2022 $2.692M was expended for civilian pay expenses in this program element, and in FY2023 $5.464M is forecasted for civilian pay expenses in this program element.

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.

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B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	647.296	559.709	566.247	0.000	566.247
Current President's Budget	626.329	559.709	725.889	0.000	725.889
Total Adjustments	-20.967	0.000	159.642	0.000	159.642
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-20.967	0.000			
• Other Adjustments	0.000	0.000	159.642	0.000	159.642

Change Summary Explanation

FY22 SBIR/STTR reduction of $20.967M.

FY24 increase of $159.642M reflects the investment in Engineering, Manufacturing, and Development (EMD) activities for the Infrared Defensive System (IRDS) and cryptographic modernization programs, as well as minor program adjustments.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Infrastructure	209.636	196.300	222.272	0.000	222.272
Description: This major thrust is comprised of: Combined Test Force (CTF), Laboratory Test and Operations (LTO), F-22 Small Projects, Operational Software Development and Reliability and Maintainability Program (RAMP) projects. Labs and CTF are continuous activities that plan and conduct development, integration, test, and verification of Operational Flight Programs (OFPs) and other software and hardware in support of the F-22 Raptor. Labs provide test and certification support, maintenance, staffing, with operation of 16 development labs including four unique major System Integration Laboratories (SILs): Agile Integration Lab (AIL) with the Flying Test Bed (FTB), Ogden Test Enterprise (OTE) Lab, Air Combat Simulation (ACS) Lab, and the Vehicle System Simulator (VSS) Lab. The F-22 CTF located at Edwards Air Force Base, CA, is the hub for developmental test efforts for the entire F-22 enterprise. It conducts full-up weapons system testing to assess the effect of the F-22 combined characteristics of stealth, speed, maneuverability, and integrated avionics upon mission accomplishment. The CTF uses operationally significant ground and flight test scenarios to identify system					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
performance deficiencies early before they are more difficult and costly to resolve. Engines on CTF aircraft are supported under Infrastructure as well. F-22 Infrastructure efforts include the technical refresh of the entire F-22 development and test infrastructure, to include the F-22 CTF and all development labs. F-22 Small Projects provides technology studies, demonstrations and integration of capabilities to include, but not limited to, Low Observable (LO) signature management, threat modeling support, Developmental Test (DT) weapon assets, weapons, Pilot Training (PT), Pilot Vehicle Interface (PVI), countermeasures, helmet, future crypto upgrades, and Open System Architecture (OSE) / Open Systems Enclave (OSE) activities. Additionally, Small Projects will include program requirements associated with dynamic Synthetic Aperture Radar (SAR), cyber security, flight test engine refurbishment, support equipment development, Government Furnished Equipment (GFE), Engine Enhancements (or similar), and Electronic Warfare (EW) system enhancements to counter evolving threats. Operational Software Development utilizes commercially available agile and lean best practices to transform and accelerate the F-22 Raptor's modernization processes to develop, test, and field new capability enhancements. This includes, but is not limited to, the expansion of a cloud-based software development environment and partnering with commercial companies to adopt industry product development best practices. The Reliability, Availability, and Maintainability Program (RAMP) provides solution identification and integration of modifications to improve reliability, availability and maintainability (RAM) for the F-22 fleet. The associated RAMP efforts (O&S funded) develop candidate initiatives, which are down-selected by Air Combat Command, for implementation based on development maturity and impact on the F-22 life cycle costs. RDT&E funding within Infrastructure may be used to improve RAM on F-22 test aircraft as part of the overarching F-22 RAMP effort. Program mission support costs are included in this major thrust. ***FY 2023 Plans:*** Provide support to the SILs for faster testing and assessment of F-22 enhancements. Continue to update critical systems required to support new aircraft configurations and capabilities. Further continue lab test planning using agile methods for the following programs: Mode 5 IFF, Link 16, OFP releases, Sensor Systems and Advanced Technology Development (ATD) to hand off to the CTF for testing. Continue to update critical systems to include technology refresh and laboratory optimization improvements.					

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Air Force		Date: March 2023
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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Small projects continues technology planning studies and demonstrations for DT weapon assets, threat modeling support, test support, test aircraft modifications, Common Range Integrated Instrumentation System (CRIIS) integration, cyber security, engine enhancements, crypto, dynamic SAR, GFE, PT, EW enhancements, and adds Quick Reaction Instrumentation Package (QRIP) development, and Fox Tablet integration. Operational Software Development continues maturing and scaling cloud-based computing environment to leverage commercially-based agile software and hardware development best practices and tools to increase the speed and quality of product delivery to the warfighter. RAMP continues retrofit modifications on F-22 test aircraft in order to improve system/component reliability, maintainability and reduce F-22 weapon system life cycle costs. ***FY 2024 Base Plans:*** Provide support to the SILs for faster testing and assessment of F-22 enhancements. Continue to update critical systems required to support new aircraft configurations and capabilities. Further continue Lab test planning using agile methods for the following programs: Mode 5 IFF, Link 16, OFP releases, Sensor Systems and ATD to hand off to the CTF for testing. Continue to update critical systems to include technology refresh and laboratory optimization improvements. Small projects continues technology planning studies and demonstrations for DT weapon assets, threat modeling support, test support, test aircraft modifications, CRIIS integration, cyber security, engine enhancements, crypto, dynamic SAR, GFE, PT, EW enhancements, QRIP development, OSA/OSE activities, and Fox Tablet integration. Operational Software Development continues maturing and scaling cloud-based computing environment to leverage commercially-based agile software and hardware development best practices and tools to increase the speed and quality of product delivery to the warfighter. RAMP continues retrofit modifications on F-22 test aircraft in order to improve system/component reliability, maintainability and reduce F-22 weapon system life cycle costs. ***FY 2024 OCO Plans:***					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase of $25.972M from FY23 to FY24 supports design and delivery of multiple sets of special test equipment required for upgrades to the radar, weapons, sensors and the airworthiness certification of the OFP. New equipment reduces unscheduled maintenance, improves the throughput and performance of F-22 labs and CTF, improves the quality of overall product, reduces risk to flight test, and accelerates delivery of capabilities to Operational Test (OT) for eventual fielding.					
Title: Advanced Technology Development (ATD) ***Description:*** Technology maturation, risk reduction, studies, demonstrations and prototypes of classified F-22 development efforts. The F-22 Advanced Technology Development (ATD) program is conducted using a rapid acquisition construct leveraging commercial best practices such as agile and lean. This allows the F-22 Raptor enterprise to develop, test, and field software/hardware from multiple programs (product lines) using a scheduled cadence for capabilities as they mature. ***FY 2023 Plans:*** Continue technology maturation and risk reduction projects in support of various F-22 development efforts. Additionally, continue to mature the Low Drag Tanks and Pylons (LDTP) capabilities as part of its risk reduction activities. ***FY 2024 Base Plans:*** Continue technology maturation, development, and risk reduction projects in support of various F-22 development efforts. Examples include, but are not limited to, such efforts as: Finalize technology maturation and risk reduction (TMRR) for the Low Drag Tanks and Pylons capabilities. Continued development of advanced radar Electronic Protection (EP) capabilities for inclusion into future software updates such as EP Suite 2 (EPS2). Project Keystone - Perform TMRR for an advanced threat warning receiver technology. Accomplish integration assessment of advanced capability called Project Geyser. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:***	52.189	40.752	42.185	0.000	42.185

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Increase of $1.433M from FY23 to FY24 reflects the continuation and planned completion of the Technology Maturation and Risk Reduction (TMRR) phase for the Low Drag Tanks and Pylons effort.					
Title: Sensor Systems ***Description:*** Sensor Systems improves sensor capabilities to maintain air superiority and preserve first look, first shot, and first kill capability. This includes developing and maturing advanced Infrared Search & Track (IRST) sensor capabilities. Sensor Systems supports Operational Imperative #3, Achieving Moving Target Indication and Tracking at Scale. ***FY 2023 Plans:*** Continue Sensor Enhancements software and hardware development for future fleet release. Complete purchase and begin receipt of initial test assets, continue development environment standup, lab/system/ airframe integration, and logistics planning. Continue technology maturation and risk reduction efforts for multiple development activities. ***FY 2024 Base Plans:*** Continue Sensor Enhancements software and hardware development for future fleet release. Begin receipt of test assets, begin test program, lab/system/airframe integration, and logistics standup. Continue technology maturation and risk reduction efforts for multiple development activities. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Decrease of $7.226M from FY23 to FY24 reflects the transition from the procurement of test asset hardware to the development and integration to support EMD. Hardware purchases in FY23 and prior required a substantial investment upon contract award.	202.908	163.968	156.742	0.000	156.742
Title: Navigation Systems ***Description:*** The Navigation Systems product line consists of the software and hardware development, integration, test, and fielding necessary to ensure the F-22's ability to maintain Positioning, Navigation and Timing (PNT) capabilities, particularly in Global Positioning System (GPS) degraded environments. This effort will include the integration of Embedded GPS/Inertial Navigation System (INS) Modernization (EGI-M) (in compliance with M-Code Mandate Public Law 111-383), replacement of the legacy GPS antenna with a	24.212	22.184	0.000	0.000	0.000

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
robust Controlled Reception Pattern Antenna (CRPA), as well as other capabilities, working together to prevent exploitation of the weapon system by adversaries and to provide an anti-jam, anti-spoof PNT solution. ***FY 2023 Plans:*** Complete integration of CRPA hardware and software into platform, then begin Developmental and Operational testing. Receive EGI-M Engineering Development Modules (EDM) to begin integration into platform and testing in F-22 System Labs. ***FY 2024 Base Plans:*** FY 2024 base plans are documented in the CRPA and EGI-M major thrusts. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** In FY24, CRPA and EGI-M programs will be separated into their own major thrusts due to Major Capability Acquisition (MCA) program standup and transition out of Middle Tier Acquisition (MTA) authority. Development and integration activities related to Navigation systems are still ongoing.					
Title: CRPA ***Description:*** This is not a new start. Work previously accomplished in Navigation Major thrust. The CRPA product line consists of the software and hardware development, integration, test, and fielding necessary to ensure the F-22's ability to maintain PNT capabilities, particularly in GPS degraded environments. Replacing the F-22's legacy Fixed Reception Pattern Array (FRPA) antenna, CRPA provides an array of antenna elements that work together to drastically reduce adversaries ability to jam or otherwise interfere with GPS signals. ***FY 2023 Plans:*** In FY23 efforts in Navigation Major thrust. ***FY 2024 Base Plans:*** F-22 will continue DT/OT concurrent testing of CRPA hardware. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:***	0.000	0.000	13.319	0.000	13.319

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
FY24 reflects the separation of CRPA from the Navigation Systems major thrust due to the planned transition from MTA authority to MCA program. Slight decrease of $3.865M from FY23 to FY24 allows for the continuation of testing planned for CRPA hardware.					
Title: EGI-M ***Description:*** This is not a new start. FY23 work accomplished in Navigation Major Thrust. In compliance with M-Code Mandate Public Law 111-383, the EGI-M product line consists of the integration, test, and fielding necessary to ensure the F-22's ability to maintain PNT capabilities, particularly in GPS degraded environments. Replacing the F-22's legacy GPS systems, EGI-M will provide an M-Code compliant, anti-spoofing PNT solution to prevent exploitation of the weapon system by adversaries, enable more accurate tracking of GPS satellites, and support a more secure and flexible cryptography architecture. This major thrust will also cover the M-Code Weapons product line, consisting of the integration, test, and fielding of software updates necessary to ensure the F-22's ability to employ M-Code configured weapons on F-22s without M-Code capability. The AF Weapons Program Office is scheduled to field M-Code-enabled weapons prior to availability of an M-Code GPS solution for the F-22. ***FY 2023 Plans:*** FY23 plans for EGI-M include initiation of Group A development, and early integration of the EGI-M in F-22 System Labs accomplished in Navigation Major Thrust. ***FY 2024 Base Plans:*** F-22 will finalize Group A design and complete integration activities with the Engineering Development Models (EDM) and move on to the Production Representative Units (PRU) in order to accomplish flight certification. Due to the high number of interfaces the EGI-M will have within the platform, integration of the PRUs will continue into FY25. Begin development and integration of M-Code Weapons software solution in order to achieve flight certification by FY25. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:***	0.000	0.000	13.174	0.000	13.174

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
FY24 reflects the separation of EGI-M from the Navigation Systems major thrust due to the transition from MTA authority to MCA program. Increase of $8.174M from FY23 to FY24 is attributable to entrance into DT/OT, as well as the integration and testing of software necessary to ensure the F-22's ability to employ M-Code configured weapons.					
Title: Communication Systems	124.946	88.843	0.000	0.000	0.000
Description: Communication Systems consists of software and hardware development, test, and certifications necessary to field systems and capabilities for combat with a joint force including Link 16 Transmit and tactical Mode 5 Identify Friend or Foe (IFF) Challenge and Reply. Link 16 Transmit will be accomplished via an Open System Architecture (OSA) integrated with F-22 legacy avionics and enable tactical data sharing between both 5th generation and 4th generation aircraft. The OSA implementation will provide a pathway to more competitive and open F-22 modernization. Mode 5 IFF is a Joint Requirements Oversight Council-mandated Blue Force identification capability that improves Raptor survivability and reduces fratricide risk DoD-wide. This capability brings significantly enhanced combat identification in both quality and security. ***FY 2023 Plans:*** Continue software development for additional Link 16 and Mode 5 IFF Reply capabilities for fielding with subsequent releases. Continue development and system lab test of hardware and software for Mode 5 IFF Challenge capabilities. Complete delivery of Mode 5 IFF Challenge DT/OT hardware kits. Complete qualification activities of Mode 5 IFF Challenge power supplies and crypto modules. Cryptographic Modernization program activities in FY23 were previously documented within the Communication Systems major thrust. This program has been separated into its own major thrust beginning in FY24. ***FY 2024 Base Plans:*** FY 2024 base plans are documented in the Link 16 and OSA improvements and Mode 5 Challenge major thrusts. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:***					

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
In FY24, Link 16/OSA improvements and Mode 5 Challenge programs will be separated into their own major thrusts due to the projected MCA program standup and transition out of MTA authority. Development and integration activities related to Communication systems are still ongoing.					
Title: Link 16 and OSA Improvements ***Description:*** This is not a new start. Work in FY23 in Communication Major Thrust. Develop and field Link 16 upgrades and OSA improvements to enable tactical data sharing between 5th generation and 4th generation aircraft. ***FY 2023 Plans:*** FY 2023 plans for Link 16 and OSA improvements are documented in the Communication Systems major thrust. ***FY 2024 Base Plans:*** Continue software development, integration, test, and incremental upgrade activities for Link 16 messages. Complete development, integration, and flight test of Link 16 J-voice capability. Incorporate open mission systems/communication suite requirements as well as enhancements of OSA interoperability with different Computer Software Configuration Items (CSCI) and improve system fault reporting. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY24 reflects the separation of Link 16 and OSA improvements from the Communication Systems major thrust due to the planned transition from MTA authority to MCA program. Decrease of $20.014M from FY23 to FY24 is attributable to the planned completion of threshold hardware and software development, and continuation of software development for increased Link 16 and OSA capabilities.	0.000	0.000	25.779	0.000	25.779
Title: Mode 5 IFF Challenge ***Description:*** This is not a new start. Work in FY23 in Communication Major Thrust. Mode 5 IFF is a Joint Requirements Oversight Council-mandated Blue Force identification capability that improves Raptor survivability and reduces fratricide risk DoD-wide. This capability brings significantly enhanced combat identification in both quality and security. The Mode 5 IFF Challenge capability incorporates new and updated hardware and software to add a new waveform, new cryptography, and additional data. ***FY 2023 Plans:***	0.000	0.000	49.018	0.000	49.018

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
FY 2023 Plans for Mode 5 are documented in the Communication Systems major thrust. ***FY 2024 Base Plans:*** Continue software development and lab testing of Mode 5 Level 1 capabilities. Continue integration activities of Mode 5 Challenge circuit cards and crypto card hardware. Finalize Air Traffic Control Radar Beacon System/ IFF/Mark XII/Mark XIIA, System IFF (AIMS) platform certification for Selective Identification Feature (SIF) Modes and Mode 5 Level 1, Formats 0 and 3. Continue AIMS platform certification activities for Mode 5 Level 1, Formats 1, 2, & 4 and Supermode SIF and Level 1. Continue spectrum certification activities to obtain a Stage 3 Radio Frequency Authorization (RFA). ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY24 reflects the separation of Mode 5 IFF Challenge from the Communication Systems major thrust due to the planned transition from MTA authority to MCA program. Increase of $5.968M from FY23 to FY24 allows for the continued development, test, and integration of critical Communication capabilities.					
Title: Low Drag Tanks and Pylons ***Description:*** The F-22 LDTP capability is critical to maintaining Air Superiority in the joint fight and combating emerging threats. The F-22 LDTPs are advanced technological designs providing increased persistence and range while maintaining lethality and survivability. The low drag tanks are intended to minimally increase drag for external tank carriage, facilitate supersonic flight with external tanks and extend the range of the F-22. The pylons are equipped with smart rack pneumatic technology to accurately control ejection performance and smooth wind-swept surface for minimum drag without store. LDTP risk reduction activities are captured under the ATD major thrust. Documentation of the development and integration components as part of the EMD program is captured under the LDTP major thrust. ***FY 2023 Plans:***	12.438	47.662	40.000	0.000	40.000

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Continue technology maturation and risk reduction projects while transitioning to EMD, where operational testing will be accomplished in parallel with developmental testing efforts. Accomplish software and hardware development for future fleet release to support both old and new pylon/tank configurations. ***FY 2024 Base Plans:*** Finalize technology maturation and risk reduction while continuing EMD program. EMD objectives include the procurement of LDTP assets, to include support equipment, evaluation of designs for improvement, flight test execution for threshold envelope (1.2 Mach), and LDTP qualification and certification. Additionally, the development and formulization of software requirements to support Operational Flight Program (OFP) integration will be accomplished in FY24. The analysis, flight test and non-recurring engineering activities will ensure the program's transition to production to support required asset available (RAA) fielding with threshold capabilities. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Decrease of $7.662M from FY23 to FY24 allows for the continuation the Low Drag Tanks and Pylons hardware and software development during the EMD phase.					
Title: Viability ***Description:*** This is not a new start. Viability includes the Infrared Defensive System (IRDS), Keystone, other programs to address future threats. IRDS improves missile launch detector capabilities by enabling an infrared defensive system, as well as other efforts that enhance the F-22 platform by addressing future threats for survivability in defensive and offensive mission aspects via software and/or hardware capability enhancements. Keystone increases radar warning capabilities, pilot situational awareness, and increased effectiveness for certain countermeasures. Viability reflects the continuation of work from the FY23PB that began as risk reduction and technology maturation activities in the ATD major thrust. Documentation of the development and integration components as part of the EMD program will be captured under the Viability major thrust. ***FY 2023 Plans:***	0.000	0.000	138.400	0.000	138.400

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Continue technology maturation and risk reduction activities captured under the ATD major thrust in FY23, leading to capability development for IRDS, Keystone, and other Viability projects. ***FY 2024 Base Plans:*** Continue efforts that began in the ATD project to develop IRDS software and hardware for future fleet release. Begin software integration activities and start purchasing test assets. Begin EMD for Keystone. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase of $138.400M reflects the beginning of development and integration activities for IRDS and other capability enhancements activities to enable F-22 modernization.					
Title: Cryptographic Modernization ***Description:*** This is not a new start. The Cryptographic Modernization program will update F-22 radios with revised interoperability and cryptographic security requirements as mandated by the Second Generation Anti-Jam Tactical UHF Radio for NATO (SATURN), U.S. Procurement Specification SS103118. This major thrust also covers F-22 program activities required to update Tactical Secure Voice Cryptographic Interoperability Specification (TSVCIS) 2.1 to version 3.1.1, a key component of Cryptographic Modernization Planning as directed by CJCSI-6510.02D and IAW with guidance from the National Cryptographic Solution Management Office (NSCMO), dated August 2020. Cryptographic Modernization program activities in FY23 were previously documented within the Communication Systems major thrust. This program has been separated into its own major thrust beginning in FY24. ***FY 2023 Plans:*** Efforts for Cryptographic Modernization were contained in the Communication Systems major thrust in the FY23PB. This program has been separated into its own major thrust beginning in FY24. ***FY 2024 Base Plans:*** This is not a new start in FY24. A new major thrust is being created for Cryptographic Modernization due to MCA program standup and transition out of MTA authority. FY23 activities were previously documented within the	0.000	0.000	25.000	0.000	25.000

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Communication Systems major thrust in the FY23PB. FY24 efforts include the development of SATURN and TSVCIS solutions and the certification process with NSA. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY24 reflects the separation of Cryptographic Modernization from the Communication Systems major thrust due to the planned transition from MTA authority to MCA program. Planned FY24 execution of $25.000M includes activities associated with the development of SATURN and TSVCIS solutions.					
Accomplishments/Planned Programs Subtotals	626.329	559.709	725.889	0.000	725.889

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• APAF 05 Line Item F02200: *F-22A Squadrons, PE 0207138F**	442.364	795.969	899.187	-	899.187	937.272	1,025.784	1,058.728	452.740	0.000	5,612.044

Remarks

NOTES:

*F-22A Squadrons, APAF/PE 0207138F, includes funding for F-22A Squadrons BPs 11 (Aircraft Modifications), 13 (Post-Production Support), 16 (Initial Spares), and 19 (Depot Activation).

E. Acquisition Strategy

The F-22 utilized Sec 804 Middle Tier of Acquisition (MTA) to rapidly develop and field advanced capability. Development efforts were conducted under a Rapid Prototyping MTA, which will conclude at the end of FY23 and transition to Major Capability Acquisition (MCA), Software pathways, or other follow-on acquisition programs starting in FY24. The programs will use the same Indefinite Delivery/Indefinite Quantity (ID/IQ) contract vehicles established under the MTA in order to maximize flexibility to start, stop, accelerate and decelerate projects as required and provide maximum flexibility to manage various modernization projects. In conjunction with the Raptor Enhancement Development & Integration II (REDI II) ID/IQ ordering contract, the new Advanced Raptor Enhancement and Sustainment (ARES) ID/IQ is a follow-on contract that has begun taking orders in FY22. The REDI II and ARES contracts allow for the issuance of orders for efforts associated with the planning, analysis, design, development, qualification, test and documentation of F-22 weapon system performance enhancements, life-cycle improvements, Operational Flight Program (OFP) upgrades, and associated efforts essential to accomplishing the F-22 mission.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0207138F / *F-22A Squadrons*	**Project (Number/Name)** 674785 / *F-22*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Infrastructure	Various	Various : Various	0.000	206.944	Oct 2021	190.836	Oct 2022	216.693	Oct 2023	-		216.693	Continuing	Continuing	-
Advanced Technology Development	Various	Various : Various	0.000	52.189	Nov 2021	40.752	Nov 2022	42.185	Nov 2023	-		42.185	Continuing	Continuing	-
Sensor Systems	SS/ Various	Lockheed Martin : Fort Worth, TX	0.000	202.908	Feb 2022	163.968	Mar 2023	156.742	Oct 2023	-		156.742	Continuing	Continuing	-
Navigation Systems	SS/ Various	Lockheed Martin : Fort Worth, TX	0.000	24.212	Oct 2021	22.184	Feb 2023	-		-		-	Continuing	Continuing	-
CRPA	SS/TBD	Lockheed Martin : Fort Worth, TX	0.000	-		-		13.319	Oct 2023	-		13.319	Continuing	Continuing	-
EGI-M	SS/TBD	Lockheed Martin : Fort Worth, TX	0.000	-		-		13.174	Oct 2023	-		13.174	Continuing	Continuing	-
Communication Systems	SS/ Various	Lockheed Martin : Fort Worth, TX	0.000	124.946	Oct 2021	88.843	Oct 2022	-		-		-	Continuing	Continuing	-
Link 16 and OSA Improvements	SS/TBD	Lockheed Martin : Fort Worth, TX	0.000	-		-		25.779	Nov 2023	-		25.779	Continuing	Continuing	-
Mode 5 IFF Challenge	SS/TBD	Lockheed Martin : Fort Worth, TX	0.000	-		-		49.018	Nov 2023	-		49.018	Continuing	Continuing	-
Low Drag Tanks and Pylons	SS/CPIF	Lockheed Martin : Fort Worth, TX	0.000	12.438	Aug 2022	47.662	Mar 2023	40.000	Nov 2023	-		40.000	Continuing	Continuing	-
Viability	SS/TBD	Lockheed Martin : Fort Worth, TX	0.000	-		-		138.400	Apr 2024	-		138.400	Continuing	Continuing	-
Cryptographic Modernization	SS/TBD	Lockheed Martin : Fort Worth, TX	0.000	-		-		25.000	Apr 2024	-		25.000	Continuing	Continuing	-
		Subtotal	0.000	623.637		554.245		720.310		-		720.310	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Direct Cite Civilian Pay	Various	Not specified. : TBD	0.000	2.692	Oct 2021	5.464	Oct 2022	5.579	Oct 2023	-		5.579	0.000	13.735	-
		Subtotal	0.000	2.692		5.464		5.579		-		5.579	0.000	13.735	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Air Force			Date: March 2023
Appropriation/Budget Activity 3600 / 7	R-1 Program Element (Number/Name) PE 0207138F / *F-22A Squadrons*	Project (Number/Name) 674785 / *F-22*	

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	626.329		559.709		725.889		-		725.889	Continuing	Continuing	N/A

Remarks

Target Value of Contract is not discrete due to the number of programs within the Indefinite Delivery, Indefinite Quantity (IDIQ) construct.

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0207138F / *F-22A Squadrons*	**Project (Number/Name)** 674785 / *F-22*

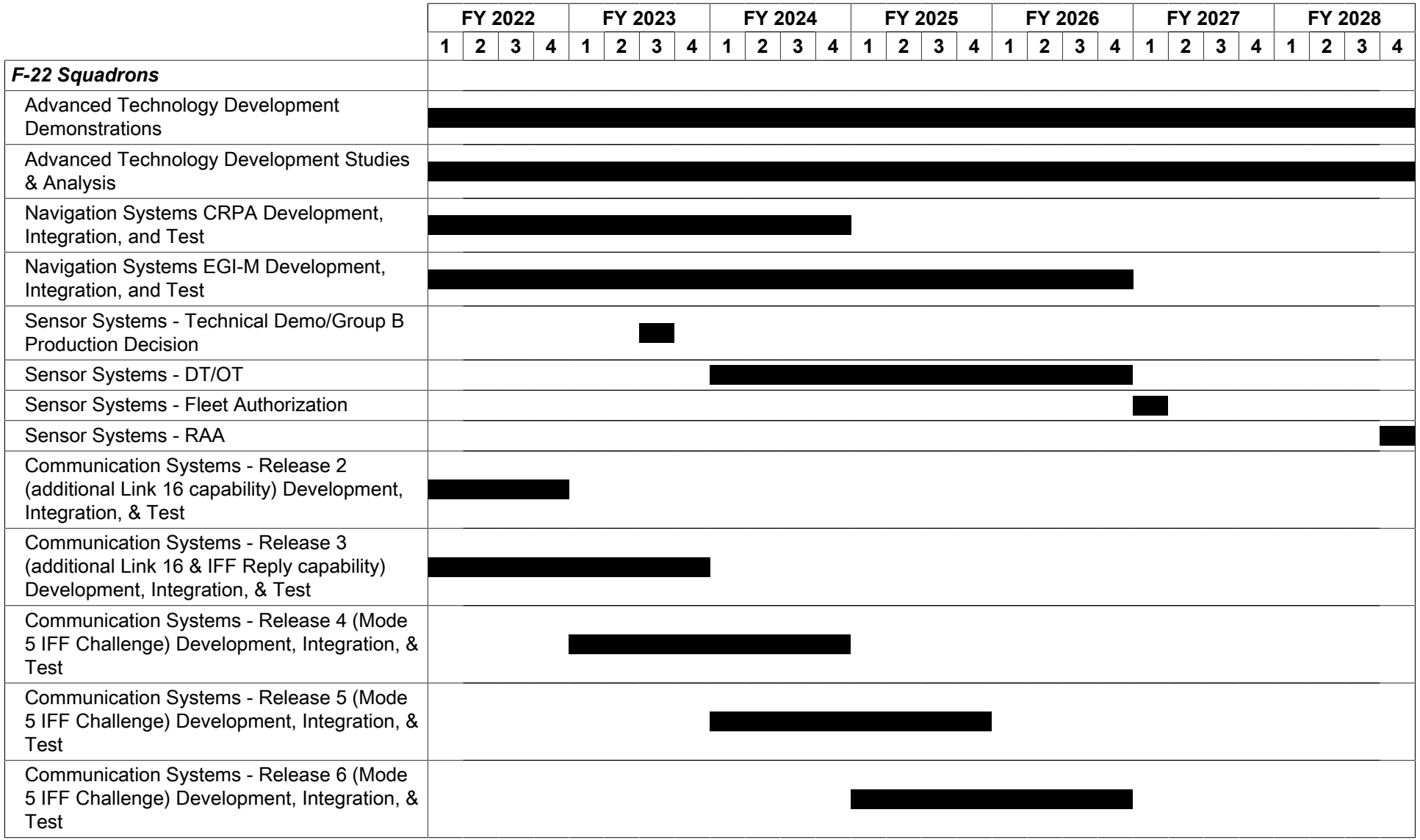

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0207138F / *F-22A Squadrons*	**Project (Number/Name)** 674785 / *F-22*

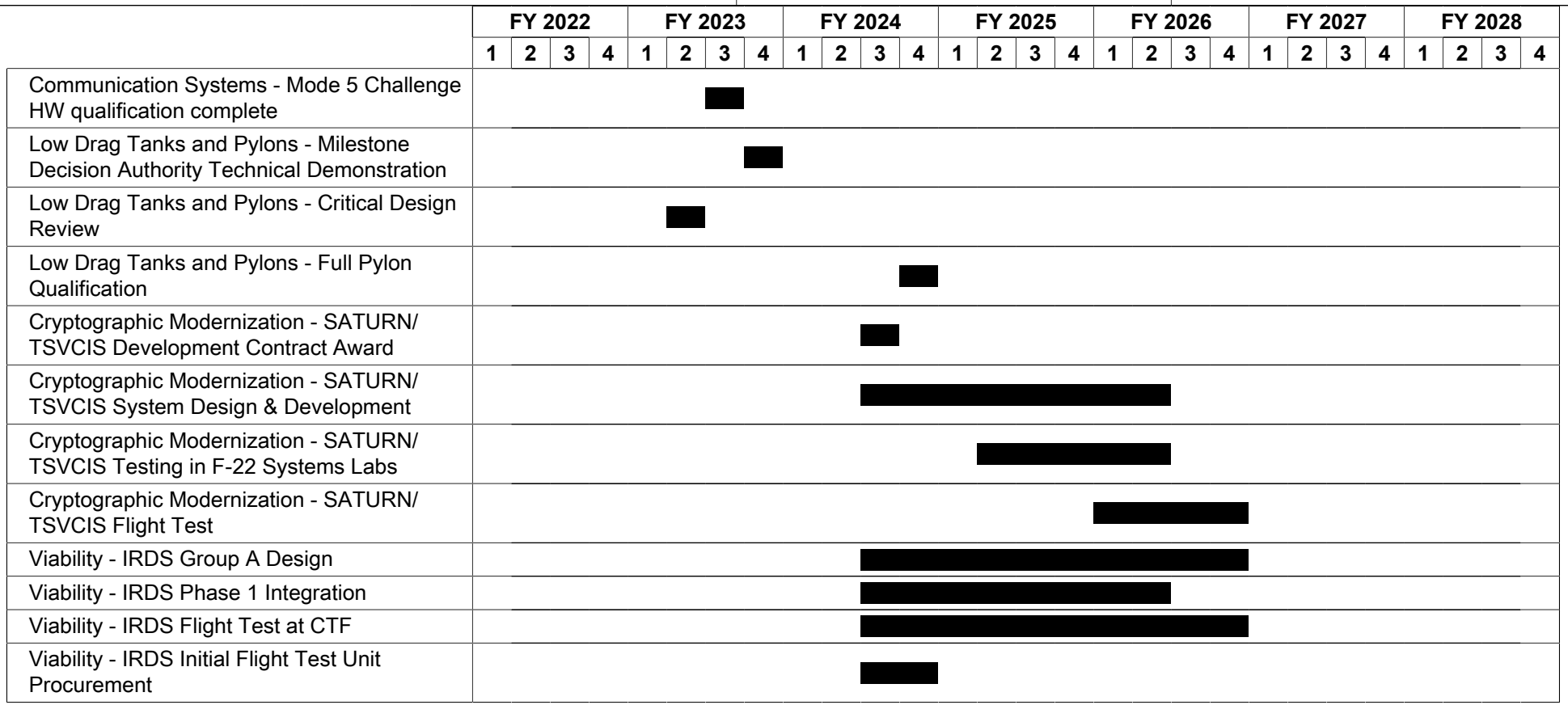

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0207138F / *F-22A Squadrons*	**Project (Number/Name)** 674785 / *F-22*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
F-22 Squadrons				
Advanced Technology Development Demonstrations	1	2022	4	2028
Advanced Technology Development Studies & Analysis	1	2022	4	2028
Navigation Systems CRPA Development, Integration, and Test	1	2022	4	2024
Navigation Systems EGI-M Development, Integration, and Test	1	2022	4	2026
Sensor Systems - Technical Demo/Group B Production Decision	3	2023	3	2023
Sensor Systems - DT/OT	1	2024	4	2026
Sensor Systems - Fleet Authorization	1	2027	1	2027
Sensor Systems - RAA	4	2028	4	2028
Communication Systems - Release 2 (additional Link 16 capability) Development, Integration, & Test	1	2022	4	2022
Communication Systems - Release 3 (additional Link 16 & IFF Reply capability) Development, Integration, & Test	1	2022	4	2023
Communication Systems - Release 4 (Mode 5 IFF Challenge) Development, Integration, & Test	1	2023	4	2024
Communication Systems - Release 5 (Mode 5 IFF Challenge) Development, Integration, & Test	1	2024	4	2025
Communication Systems - Release 6 (Mode 5 IFF Challenge) Development, Integration, & Test	1	2025	4	2026
Communication Systems - Mode 5 Challenge HW qualification complete	3	2023	3	2023
Low Drag Tanks and Pylons - Milestone Decision Authority Technical Demonstration	4	2023	4	2023
Low Drag Tanks and Pylons - Critical Design Review	2	2023	2	2023
Low Drag Tanks and Pylons - Full Pylon Qualification	4	2024	4	2024
Cryptographic Modernization - SATURN/TSVCIS Development Contract Award	3	2024	3	2024

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Air Force		Date: March 2023
Appropriation/Budget Activity 3600 / 7	**R-1 Program Element (Number/Name)** PE 0207138F / *F-22A Squadrons*	**Project (Number/Name)** 674785 / *F-22*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Cryptographic Modernization - SATURN/TSVCIS System Design & Development	3	2024	2	2026
Cryptographic Modernization - SATURN/TSVCIS Testing in F-22 Systems Labs	2	2025	2	2026
Cryptographic Modernization - SATURN/TSVCIS Flight Test	1	2026	4	2026
Viability - IRDS Group A Design	3	2024	4	2026
Viability - IRDS Phase 1 Integration	3	2024	2	2026
Viability - IRDS Flight Test at CTF	3	2024	4	2026
Viability - IRDS Initial Flight Test Unit Procurement	3	2024	4	2024