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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2017 Air Force **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	3,528.203	146.291	231.599	387.564	0.000	387.564	423.005	418.700	393.663	430.233	Continuing	Continuing
674785: <i>F-22</i>	3,528.203	143.328	178.274	286.270	0.000	286.270	290.508	284.452	370.704	290.605	Continuing	Continuing
674788: <i>F-22 Tactical Mandates</i>	0.000	2.963	53.325	101.294	0.000	101.294	132.497	134.248	22.959	139.628	0.000	586.914

**Note**

This program, BA 07 PE 0207138F, project 674785, Helmet Mounted Display and Cueing System (HMDCS), is a new start.  
 This program, BA 07 PE 0207138F, project 674785, F-22 Global Positioning System (GPS) Military Code (M-Code), is a new start.

This program, BA 07 PE 0207138F, project 674788, TACLink 16, is a new start.

Totals include funding for PRCP Program Number 265, F-22A Squadrons.

In FY13, a separate Program Element (0605213F) was created for Increment 3.2B. All Increment 3.2B efforts and associated funding prior to FY13 are included in the F-22A Squadrons (0207138F) budget documentation.

In FY15, a separate Project (Budget Program Activity Code [BPAC] 674788) was created for F-22 Tactical Mandates, formerly known as F-22 Mandates.

**A. Mission Description and Budget Item Justification**

The F-22 Raptor provides air superiority to the Joint Force; access in the highly contested operational environment; as well as, homeland and cruise missile defense for the next 25+ years. The F-22 is the only operational multi-mission fighter aircraft that combines stealth, supercruise, maneuverability and integrated avionics to make it the world's most capable combat aircraft. The Engineering and Manufacturing Development (EMD) phase of F-22 acquisition is complete. The program is now continuing pre-planned, incremental modernization development that enhances 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, and Intelligence Surveillance Reconnaissance (ISR) capabilities.

The FY2017 funding request was reduced by \$.600 million to account for the availability of prior year execution balances.

BA7 - This program is in Budget Activity 7, Operational Systems Development--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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
Previous President's Budget	146.299	262.552	382.198	0.000	382.198
Current President's Budget	146.291	231.599	387.564	0.000	387.564
Total Adjustments	-0.008	-30.953	5.366	0.000	5.366
• Congressional General Reductions	0.000	-30.000			
• 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	0.000	0.000			
• Other Adjustments	-0.008	-0.953	5.366	0.000	5.366

**Change Summary Explanation**

FY2016: -\$30M reduction for congressional reduction for underexecution/forward financed.

2017: \$5.366 increase in FY17 was the net total of a +25.3M add for M-Code and -20M rephrase for sensor enhancements and TacLink.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force										<b>Date:</b> February 2016		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons				<b>Project (Number/Name)</b> 674785 / F-22			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674785: F-22	3,528.203	143.328	178.274	286.270	0.000	286.270	290.508	284.452	370.704	290.605	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 07 PE 0207138F, project 674785, Helmet Mounted Display and Cueing System (HMDCS), is a new start.  
 This program, BA 07 PE 0207138F, project 674785, F-22 Global Positioning System (GPS) Military Code (M-Code), is a new start.

Totals include funding for PRCP Program Number 265, F-22A Squadrons.

In FY13, a separate Program Element (0605213F) was created for Increment 3.2B upon designation as an ACAT I program. All Increment 3.2B efforts and associated funding prior to FY13 are included in the F-22A Squadrons (0207138F) budget documentation.

In FY15, a separate Budget Project Activity Code (BPAC 674788) was created for F-22 Tactical Mandates, formerly known as F-22 Mandates.

F-22 development and production are complete. The remaining program consists of F-22 Operational Flight Program (OFP) updates, capability enhancements, and mandates necessary to sustain F-22 weapon system survivability, lethality and availability. The "Continuing" Cost to Complete and Total Cost reflect these initiatives.

**A. Mission Description and Budget Item Justification**

The F-22 Raptor represents the USAF's priority placed on providing the Joint Force with air dominance, operational access, and homeland & cruise missile defense for the next 25+ years. The F-22 is a multi-mission fighter aircraft that combines stealth, supercruise, advanced maneuverability and integrated avionics to make it the world's most capable combat aircraft. While F-22 Engineering and Manufacturing Development (EMD) and aircraft production completed May 2012, funding for F-22 modernization is "continuing" beyond the FYDP.

This program funds all non-MDAP development efforts for the F-22. The program is now continuing the pre-planned and evolutionary modernization effort through incremental development phases that enhance the F-22 anti-access / area denial, Air Superiority and Global Strike capabilities. The development program modernizes and upgrades the air vehicle, engine, avionics, and training systems to improve/enhance F-22 weapons, communications, and intelligence, surveillance, reconnaissance (ISR) capabilities.

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

	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
<b>Title:</b> Increment 3.2A	2.218	0.427	0.104	0.000	0.104
<b>Description:</b> The F-22 Increment 3.2A Modernization Program is software development to improve Electronic Protection, Combat Identification and Link-16 interoperability.					

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**Exhibit R-2A, RDT&E Project Justification:** PB 2017 Air Force **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22
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**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p><b><i>FY 2015 Accomplishments:</i></b> Completed Increment 3.2A software development, integration, and test. Developmental and operational test were completed. Increment 3.2A Operational Flight Program (OFP) upgrade on combat coded F-22 aircraft began July 2015 and is scheduled to complete in FY19 (concurrent with Increment 3.1).</p> <p><b><i>FY 2016 Plans:</i></b> Updating F-22 3.2A performance models in the Rail/AIL.</p> <p><b><i>FY 2017 Base Plans:</i></b> Updating F-22 3.2A performance models in the Rail/AIL.</p> <p><b><i>FY 2017 OCO Plans:</i></b> N/A</p>					
<p><b><i>Title:</i></b> Update 5</p> <p><b><i>Description:</i></b> Update 5 (U5) is one of the F-22's planned software updates that develops, tests, and fields new capabilities and capability enhancements. Software updates include changes driven by real world evolving threats, emergency/safety of flight issues, and deficiency reports. The U5 Operational Flight Program (OFP) includes Automatic Ground Collision Avoidance System (AGCAS), Intra Flight Data Link (IFDL) 5th to 4th generation interoperability mode (IFDL Gateway Mode), and basic Block I AIM-9X missile launch capability.</p> <p><b><i>FY 2015 Accomplishments:</i></b> Completed Update 5 OFP developmental and operational flight test.</p> <p><b><i>FY 2016 Plans:</i></b> Complete Fleet Release.</p> <p><b><i>FY 2017 Base Plans:</i></b> Not applicable.</p> <p><b><i>FY 2017 OCO Plans:</i></b> N/A</p>	18.000	0.000	0.000	0.000	0.000
<p><b><i>Title:</i></b> Update 6 Interoperability</p> <p><b><i>Description:</i></b> Update 6 (U6) Interoperability, is an OFP update providing cryptographic updates required by the National Security Agency (NSA) to IFDL, Link-16, and Tactical Secure Voice (TSV) to maintain interoperability with Link-16 and secure voice networks. The U6 Interoperability program builds upon the development work</p>	11.600	38.300	63.200	0.000	63.200

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
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already accomplished in the KOV-20 Cryptographic Modernization Program and integrates that development into a single OFP for fleet release. In addition, U6 Interoperability will correct other software deficiencies previously identified during operations.

***FY 2015 Accomplishments:***

Completed Crypto Modernization Critical Design Review.

***FY 2016 Plans:***

Preparing for contract award of remaining OFP content development. Update 6 Interoperability will begin design, code, and test for IFDL/Link 16 interoperability and TSV modernization. Continue integration and test of Crypto Modernization.

***FY 2017 Base Plans:***

Update 6 Interoperability will continue code/system test, and begin formal Development Test for IFDL/Link 16 interoperability and TSV modernization. Continue integration and test of Crypto Modernization.

***FY 2017 OCO Plans:***

N/A

***Title:*** Software Support

***Description:*** Software support develops, tests and fields new capabilities and capability enhancements for training devices and Integrated Maintenance Information System (IMIS) software in order to maintain concurrency with aircraft configuration and capability. Software Support includes Pilot Training Systems (PTS) and IMIS software development to include Integrated Maintenance Data System (IMDS) and Reliability and Maintainability Information System (REMIS) interface development.

***FY 2015 Accomplishments:***

Continued the Ada to C++ conversion of IMIS.

***FY 2016 Plans:***

Integrated Advanced Diagnostic Interface Tool (ADIT) and Multiplex Bus Fault Isolation (MBFI) capability within IMIS.

***FY 2017 Base Plans:***

Not Applicable.

***FY 2017 OCO Plans:***

	0.150	1.600	0.000	0.000	0.000

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
N/A					
<p><b>Title:</b> Advanced Technology Development</p> <p><b>Description:</b> Technology maturation, risk reduction, studies, and demonstrations of classified F-22 development efforts.</p> <p><b>FY 2015 Accomplishments:</b> Continued technology maturation and risk reduction.</p> <p><b>FY 2016 Plans:</b> Continued technology maturation and risk reduction.</p> <p><b>FY 2017 Base Plans:</b> Continue technology maturation and risk reduction and begin acquisition planning for Sensor Enhancements.</p> <p><b>FY 2017 OCO Plans:</b> N/A</p>	23.750	18.147	62.466	0.000	62.466
<p><b>Title:</b> System Engineering/Program Management Support</p> <p><b>Description:</b> Provides F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.</p> <p><b>FY 2015 Accomplishments:</b> Provided F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.</p> <p><b>FY 2016 Plans:</b> Provided F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.</p> <p><b>FY 2017 Base Plans:</b> Provides F-22 program-wide planning and execution including the following: Strategic Analysis and Support, Cost Estimating Data, and Systems Engineering Process Management.</p> <p><b>FY 2017 OCO Plans:</b> N/A</p>	3.200	6.200	6.600	0.000	6.600
<p><b>Title:</b> Reliability and Maintainability Maturation Program (RAMMP)</p>	0.810	0.700	0.700	0.000	0.700

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

	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p><b>Description:</b> The Reliability, Availability, and Maintainability Maturation Program (RAMMP) develops and integrates upgrades to improve reliability, availability and maintainability (RAM). The associated RAMMP RDT&amp;E effort develops candidate RAMMP initiatives which are down-selected for implementation based on their development maturity and impact on F-22 life cycle costs. RAMMP also provides for the development of urgent response requirements for the aircraft, e.g., Automatic Back-Up Oxygen System (ABOS).</p> <p><b>FY 2015 Accomplishments:</b> Developed multiple efforts to improve reliability, maintainability, and reduce F-22 Weapon System Life Cycle Costs. FY2015 active RAMMP development projects included Mighty Tough Boot seals and improved airframe-mounted nozzle system liner durability.</p> <p><b>FY 2016 Plans:</b> Limited development to improve system / component reliability &amp; maintainability and reduce F-22 Weapon System Life Cycle Costs.</p> <p><b>FY 2017 Base Plans:</b> Continue limited development to improve system / component reliability &amp; maintainability and reduce F-22 Weapon System Life Cycle Costs.</p> <p><b>FY 2017 OCO Plans:</b> N/A</p>					
<p><b>Title:</b> F-22 Small Projects</p> <p><b>Description:</b> Provides F-22 technology studies and demonstrations for Low Observable (LO) Signature Management, Threat Modeling Support, Developmental Test (DT) Weapon Assets, Pilot Training (PT), Dynamic Synthetic Aperture Radar (SAR), Flight Test Engine Refurbishment, Support Equipment Development, Windows XP Migration, Government Furnished Equipment (GFE), and Helmet Mounted Display and Cueing System (HMDCS), and Electronic Warfare (EW) system enhancements to counter evolving threats.</p> <p><b>FY 2015 Accomplishments:</b> Started F-22 technology studies and demonstrations for DT Weapons Assets, Threat Modeling Support, Test Support, Test Aircraft Modifications, Scorpion Helmet Mounted Display Demo, initial HMDCS requirements definition and acquisition planning, and GFE.</p> <p><b>FY 2016 Plans:</b></p>	3.800	18.400	22.100	0.000	22.100

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p>Continue F-22 technology studies and demonstrations for DT Weapons Assets, Threat Modeling Support, Test Support, Test Aircraft Modifications, complete HMDCS requirements definition and acquisition planning, PT Dynamic SAR, Flutter Excitation System, GFE, XP Migration, and continue acquisition planning for EW enhancements.</p> <p><b>FY 2017 Base Plans:</b> Continue F-22 technology studies and demonstrations for DT Weapons Assets, Threat Modeling Support, Test Support, Test Aircraft Modifications, CRIIS Network development, PT Dynamic SAR, Flutter Excitation System, GFE, XP Migration, and continue acquisition planning for EW enhancements.</p> <p><b>FY 2017 OCO Plans:</b> N/A</p>					
<p><b>Title:</b> Combined Test Force</p> <p><b>Description:</b> The F-22 Combined Test Force (CTF), located at Edwards Air Force Base, 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 performance deficiencies early before they are more difficult and costly to resolve.</p> <p><b>FY 2015 Accomplishments:</b> AFFTC completed Increment 3.2A testing and released a test report recommending its fielding. It also began flight tests on early iterations of Inc. 3.2B, provided AIM 9X Seek Eagle support, as well as test management support to U5, and the Pylon Wing Covers efforts. Also, early planning will be accomplished for KC-46 Refueling Certification, Tactical Mandates, and U6.</p> <p><b>FY 2016 Plans:</b> The significant programs undergoing flight test at AFFTC include: Increment 3.2B, KC-46 Refueling Certification, F-22 Tactical Mandates, Update 6, and Low Drag Pylons.</p> <p><b>FY 2017 Base Plans:</b> Significant programs scheduled for flight test at AFFTC include: Increment 3.2B, KC-46 Refueling Certification, F-22 Tactical Link, F-22 Tactical Mandates, Update 6, CRIIS, and Flutter Excitation System (FES).</p> <p><b>FY 2017 OCO Plans:</b> N/A</p>	44.800	46.100	48.100	0.000	48.100
<p><b>Title:</b> Laboratory Test &amp; Operations (LTO)</p>	35.000	48.400	55.000	0.000	55.000

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

	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p><b>Description:</b> Lab Test &amp; Operations is a continuous activity that plans and conducts development, integration, test, &amp; verification (IT&amp;V) of F-22 OFPs with F-22 hardware. LTO provides maintenance, staffing, and operation of 18 development labs including 5 unique major System Integration Laboratories (SILs): the Agile Integration Lab (AIL); the Raptor Integration Lab (RAIL); the Air Combat Simulation (ACS) Lab; Vehicle Integration Facility (VIF); and the Vehicle System Simulator (VSS). Through the ACS, LTO provides the combat air forces with advanced mission-level test and training capability through a fully representative virtual simulation.</p> <p><b>FY 2015 Accomplishments:</b> Maintained lab availability in support of F-22 programs. Updated critical systems as required to support new aircraft configurations and capabilities. Accomplished an OFP verification and risk reduction. Supported pilot training for Air Combat Command exercises and war gaming; Air Force Operation Test &amp; Evaluation Center test planning; and test event rehearsals. Supported periodic Air Force Warfare Center (AFWC) operational mission data updates. The significant programs executed for lab test were Increment 3.2A, 3.2B, Update 5 and AFWC Mission Data Loads.</p> <p><b>FY 2016 Plans:</b> Maintain lab availability in support of F-22 programs. Update critical systems as required to support new aircraft configurations and capabilities. Accomplish OFP verification and risk reduction. Support pilot training for Air Combat Command exercises and war gaming; Air Force Operation Test &amp; Evaluation Center test planning; and test event rehearsals. Support periodic AFWC operational mission data updates. The significant programs planned for lab test are Increment 3.2B, F-22 Tactical Link and Mandates, Update 6 and AFWC Mission Data Loads.</p> <p><b>FY 2017 Base Plans:</b> Maintain lab availability in support of F-22 programs. Update critical systems as required to support new aircraft configurations and capabilities. Accomplish OFP verification and risk reduction. Support pilot training for Air Combat Command exercises and war gaming; Air Force Operation Test &amp; Evaluation Center test planning; and test event rehearsals. Support periodic AFWC operational mission data updates. The significant programs planned for lab test are Increment 3.2B, F-22 TacLink 16, F-22 Tactical Mandates, Update 6, Advanced Technologies and AFWC Mission Data Loads.</p> <p><b>FY 2017 OCO Plans:</b> N/A</p>					
<b>Title:</b> Helmet Mounted Display and Cueing System (HMDCS)	0.000	0.000	3.500	0.000	3.500

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
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<p><b>Description:</b> This is an FY17 NEW START. The HMDCS program will select, integrate, test and field a mature HMDCS to take full advantage of advanced weapons such as the AIM-9X, and improved battlespace situational awareness during day/night within-visual-range engagements. The HMDCS will be integrated on all Block 30/35 Raptors.</p> <p><b>FY 2015 Accomplishments:</b> This is a FY17 NEW START.</p> <p><b>FY 2016 Plans:</b> This is a FY17 NEW START.</p> <p><b>FY 2017 Base Plans:</b> Conduct prototype demonstration; develop, integrate and test HMDCS hardware and software.</p> <p><b>FY 2017 OCO Plans:</b> N/A</p>					
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<p><b>Title:</b> F-22 Global Positioning System (GPS) Military Code (M-Code)</p> <p><b>Description:</b> This is an FY17 NEW START. The F-22 Global Positioning System (GPS) Military Code (M-Code) program consists of the software and hardware development, test and fielding necessary to ensure the F-22's ability to maintain Precision, Navigation and Timing (PNT) capabilities in GPS degraded environments. This effort will include the integration of Embedded GPS/Inertial Navigation System (INS) Modernization (EGI-M) onto the F-22 for M-Code, associated GPS enhancements, as well as other capabilities, to prevent exploitation of the weapon system by adversaries and provide assured PNT.</p> <p><b>FY 2015 Accomplishments:</b> Not applicable.</p> <p><b>FY 2016 Plans:</b> Not applicable.</p> <p><b>FY 2017 Base Plans:</b> F-22 GPS M-Code will support hardware design and development of the Embedded GPS/Inertial Navigation System (INS) Modernization (EGI-M) program and begin design, code and software integration testing for the F-22 platform interface.</p> <p><b>FY 2017 OCO Plans:</b></p>	0.000	0.000	24.500	0.000	24.500
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
	N/A	N/A	N/A	N/A	N/A
<b>Accomplishments/Planned Programs Subtotals</b>	143.328	178.274	286.270	0.000	286.270

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

<u>Line Item</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017 Base</u>	<u>FY 2017 OCO</u>	<u>FY 2017 Total</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF: BA05: Line Item # F02200: <i>F-22A Squadrons, PE 0207138F*</i>	286.426	119.171	271.593	0.000	271.593	218.441	227.011	368.986	524.575	Continuing	Continuing
• RDT&E: BA07: PE 0605213F: <i>Increment 3.2B, RDT&amp;E**</i>	163.877	140.640	70.290	0.000	70.290	0.000	0.000	0.000	0.000	0.000	598.333
• APAF: BA05: Line Item # F2232B: <i>F-22 Increment 3.2B, PE 0207138F***</i>	28.500	67.147	82.841	0.000	82.841	151.399	13.081	20.373	20.749	0.000	384.090
• MILCON: PE 0207138F: <i>MILCON</i>	11.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	24.900
• RDT&E: BA07: PE 0207163F: <i>AIM-120D, AMRAAM, RDT&amp;E****</i>	23.800	5.820	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	50.450
• RDT&E: BA07: PE 0207138F: <i>F-22 Tactical Mandates</i>	2.963	53.325	101.294	0.000	101.294	132.497	134.248	22.959	139.628	0.000	586.914

**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) only.

\*\*F-22 Increment 3.2B, RDT&E/PE 0605213F, includes funding for FY13 and beyond identified in the Increment 3.2B documentation. PEs 0605213F and 0207318F share lab and infrastructure support costs across the F-22 enterprise.

\*\*\*F-22 Increment 3.2B, APAF/PE 0207138F includes funding for associated Increment 3.2B BPs 11 (Aircraft Modifications) and 16 (Initial Spares) only.

\*\*\*\*AIM-120D, AMRAAM RDT&E/PE 0207163F, funding provides for the AIM-120 development as a part of the F-22 Increment 3.2B effort.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force	<b>Date:</b> February 2016
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674785 / <i>F-22</i>
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**D. Acquisition Strategy**

The Raptor Enhancement Development & Integration (REDI) contract is an Indefinite Delivery/Indefinite Quantity (ID/IQ) Ordering contract that maximizes flexibility to start, stop, accelerate and decelerate projects as required. The REDI contract was established to be more responsive to evolving war fighter requirements. The REDI contract allows the issuance of orders for the highest priority war fighter capabilities in operationally meaningful capability increments: requirements analysis, contractor cost estimates and studies, development and demonstration of capability enhancements, and unanticipated future war fighter requirements. Each increment is broken into phases to initiate requirements analysis, the design phase and the development, integration and verification phase of a specific incremental development effort. The REDI II contract is a follow-on Indefinite Delivery/Indefinite Quantity (ID/IQ) contract to the initial REDI contract. The REDI II contract is used to issue delivery and task orders for 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.

**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 2017 Air Force** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22
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<b>Product Development (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
Increment 3.2A	SS/CPIF	Lockheed Martin : Fort Worth, TX	396.277	2.218	Mar 2015	0.427	Mar 2016	0.104	Mar 2017	0.000		0.104	0.000	399.026	-
Update 5	SS/Various	Lockheed Martin : Fort Worth, TX	92.561	18.000	Feb 2015	0.000		0.000		0.000		0.000	0.000	110.561	-
Update 6 Interoperability	SS/Various	Lockheed Martin : Fort Worth, TX	34.426	11.600	Jan 2015	38.300	Nov 2015	63.200	Nov 2016	0.000		63.200	44.500	192.026	-
Software Support	SS/Various	Lockheed Martin : Fort Worth, TX	290.504	0.000		1.600	Nov 2015	0.000		0.000		0.000	0.000	292.104	-
Advanced Technology Development	Various	Various : Various	73.282	23.900	Dec 2014	18.147	Feb 2016	62.466	Dec 2016	0.000		62.466	Continuing	Continuing	-
VAX Migration	SS/CPIF	Lockheed Martin : Fort Worth, TX	178.724	0.000		0.000		0.000		0.000		0.000	0.000	178.724	-
System Engineering / Program Management	SS/CPFF	Lockheed Martin : Fort Worth, TX	207.122	3.200	Apr 2015	6.200	Jan 2016	6.600	Jan 2017	0.000		6.600	Continuing	Continuing	-
RAMMP	SS/CPFF	Lockheed Martin : Fort Worth, TX	167.701	0.810	May 2015	0.700	Dec 2015	0.700	Dec 2016	0.000		0.700	Continuing	Continuing	-
F-22 Small Projects	Various	Various : Various	550.910	3.800	Jan 2015	18.400	Nov 2015	22.100	Nov 2016	0.000		22.100	Continuing	Continuing	-
HMDCS	Various	Various : Various	0.000	0.000		0.000		3.500	Jan 2017	0.000		3.500	16.700	20.200	-
Global Positioning System (GPS) M-Code	SS/Various	Lockheed Martin : Fort Worth, TX	0.000	0.000		0.000		24.500	Jan 2017	0.000		24.500	0.000	24.500	-
<b>Subtotal</b>			1,991.507	63.528		83.774		183.170		0.000		183.170	-	-	-

<b>Support (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
<b>Subtotal</b>			-	-		-		-		-		-	-	-	-



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**Exhibit R-4, RDT&E Schedule Profile: PB 2017 Air Force** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674785 / F-22
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	FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020				FY 2021			
	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
Increment 3.2A Development, Integration, & Test	■																											
Increment 3.2A Final Operational Test & Evaluation (FOT&E)	■	■	■																									
Increment 3.2A Fleet Release				■																								
Update 5 Fleet Release Block 20					■	■																						
Update 5 Fleet Release Block 30/35					■	■																						
Update 6 Interoperability Requirements Analysis/Design		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Update 6 Interoperability Development, Integration, & Test		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Update 6 Interoperability Preliminary Design Review (PDR)										■	■																	
Update 6 Interoperability Milestone B										■	■																	
Update 6 Interoperability Critical Design Review (CDR)														■	■													
Update 6 Interoperability Flight Test														■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Update 6 Interoperability Milestone C																												
Update 6 Interoperability Full Deployment Decision (Fleet Release)																												
Advanced Technology Development Demonstrations	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Advanced Technology Development Studies & Analysis	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
HMDCS Development, Integration and Test																												
HMDCS Installation																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2017 Air Force **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674785 / <i>F-22</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Increment 3.2A Development, Integration, & Test	1	2015	1	2015
Increment 3.2A Final Operational Test & Evaluation (FOT&E)	1	2015	3	2015
Increment 3.2A Fleet Release	4	2015	4	2015
Update 5 Fleet Release Block 20	1	2016	1	2016
Update 5 Fleet Release Block 30/35	1	2016	1	2016
Update 6 Interoperability Requirements Analysis/Design	2	2015	2	2017
Update 6 Interoperability Development, Integration, & Test	2	2015	4	2018
Update 6 Interoperability Preliminary Design Review (PDR)	2	2017	2	2017
Update 6 Interoperability Milestone B	2	2017	2	2017
Update 6 Interoperability Critical Design Review (CDR)	2	2018	2	2018
Update 6 Interoperability Flight Test	1	2018	4	2019
Update 6 Interoperability Milestone C	4	2019	4	2019
Update 6 Interoperability Full Deployment Decision (Fleet Release)	4	2019	4	2019
Advanced Technology Development Demonstrations	1	2015	4	2021
Advanced Technology Development Studies & Analysis	1	2015	4	2021
HMDCS Development, Integration and Test	2	2017	3	2020
HMDCS Installation	4	2020	4	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force										<b>Date:</b> February 2016		
<b>Appropriation/Budget Activity</b> 3600 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons				<b>Project (Number/Name)</b> 674788 / F-22 Tactical Mandates			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
674788: F-22 Tactical Mandates	0.000	2.963	53.325	101.294	0.000	101.294	132.497	134.248	22.959	139.628	0.000	586.914
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 07 PE 0207138F, project 674788, TACLink 16, is a new start.

Totals include funding for PRCP Program Number, 265 F-22 Tactical Mandates

In FY15, a separate Budget Program Activity Code (BPAC 674788) within PE 0207138F was created for F-22 Tactical Mandates, formerly known as F-22 Mandates. F-22 Tactical Mandates proposal activities were initiated in BPAC 674785 in FY14.

**A. Mission Description and Budget Item Justification**

The TACLink 16 and F-22 Tactical Mandates programs are follow-on modernization efforts to Increment 3.2B. The programs will provide Open Systems Architecture, Link 16 Transmit and Mode 5 Identification Friend or Foe (IFF) Transpond/Interrogate on the F-22. Thru the FY16 budget, these capabilities were all part of the F-22 Tactical Mandates program. Via the TACLink 16 program, the FY17 budget request recognizes an important opportunity to accelerate fielding of Open Systems Architecture and Link 16 Transmit onto the F-22 one year earlier than possible as part of F-22 Tactical Mandates.

Capability integration for the TACLink 16 program will be accomplished using Open Systems Architecture to enable future life cycle savings opportunities for the F-22 and as a risk reduction effort for the F-22 Tactical Mandates program. Both programs will require hardware and software modifications to the Block 30/35 combat coded F-22 fleet.

Link 16 Transmit enables the 5th generation F-22 fighter aircraft to transmit tactical information through datalink to the 5th generation F-35 (a.k.a. 5th-to-5th), as well as to 4th generation aircraft (a.k.a. 5th-to-4th). Enabling the F-22 to transmit tactical data to other aircraft types via datalink is a top Air Force priority. With Link 16 Transmit, the Raptor's superior 5th Generation sensor suite will be able to aid the situational awareness of all participants in the operating environment. The TACLink 16 program is an opportunity to accelerate the install of this key data link capability onto the F-22 Raptor.

Mode 5 IFF is a Joint Requirements Oversight Council-mandated Blue Force identification capability that improves Raptor survivability and reduces fratricide risk DoD-wide.

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

	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
<b>Title:</b> TACLink 16	0.000	0.000	41.698	0.000	41.698

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force	<b>Date:</b> February 2016
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<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674788 / F-22 Tactical Mandates
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
<p><b>Description:</b> The TACLink 16 program will accelerate fielding of key technologies previously aligned with the F-22 Tactical Mandates program. The program consists of software and hardware development necessary to field basic Link 16 Transmit capability on the F-22. Link 16 Transmit will be accomplished via an Open Mission Systems (OMS) architecture integrated with F-22 legacy avionics. The OMS implementation will provide a pathway to more competitive and open future F-22 modernization. Includes Mission Support of the F-22 Program Office: travel, computer costs, and other miscellaneous contract support.</p> <p><b>FY 2015 Accomplishments:</b> N/A</p> <p><b>FY 2016 Plans:</b> N/A</p> <p><b>FY 2017 Base Plans:</b> TACLink 16 will begin design, software modeling, and test.</p> <p><b>FY 2017 OCO Plans:</b> N/A</p>					
<p><b>Title:</b> F-22 Tactical Mandates</p> <p><b>Description:</b> The F-22 Tactical Mandates program consists of software development and hardware necessary to provide tactical Mode 5 IFF on the F-22. The program also provides an opportunity to incorporate other updates to Link 16 capabilities into the Raptor. Includes Mission Support of the F-22 Program Office: travel, computer costs, and other miscellaneous contract support.</p> <p><b>FY 2015 Accomplishments:</b> F-22 Tactical Mandates began requirements analysis, capabilities analysis and selection, design maturation and early software modeling and test. Initiated design efforts.</p> <p><b>FY 2016 Plans:</b> The contract for the Pre-Engineering &amp; Manufacturing Development effort will be awarded, and F-22 Tactical Mandates will continue capabilities analysis, design, and software modeling and test.</p> <p><b>FY 2017 Base Plans:</b> F-22 Tactical Mandates will continue design, software modeling, and test.</p> <p><b>FY 2017 OCO Plans:</b></p>	2.963	53.325	59.596	0.000	59.596

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674788 / <i>F-22 Tactical Mandates</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	2.963	53.325	101.294	0.000	101.294

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

<b>Line Item</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDT&E: BA07: PE 0207138F: <i>F-22A Squadrons*</i>	143.328	178.274	286.270	0.000	286.270	290.508	284.452	370.704	290.605	Continuing	Continuing
• APAF: BA05: Line Item #F02200: <i>F-22A Squadrons, PE 0207138F**</i>	286.426	119.171	271.593	0.000	271.593	218.441	227.011	368.986	524.575	Continuing	Continuing
• RDT&E, BA05, PE 0605213F: <i>F-22A Increment 3.2B***</i>	163.877	140.640	70.290	0.000	70.290	0.000	0.000	0.000	1.478	0.000	598.333
• APAF: BA05: Line Item #F2232B: <i>F-22A Increment 3.2B, PE 0207138F****</i>	28.500	61.147	82.841	0.000	82.841	151.399	13.081	20.373	20.749	0.000	384.090

**Remarks**

\*F-22 Squadrons, RDT&E/PE 0207138F, includes funding for F-22A Squadrons modernization and development BPAC 674785.

\*\*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) only.

\*\*\*F-22 Increment 3.2B, RDT&E/PE 0605213F, includes funding for the development of F-22A, Increment 3.2B and share lab and infrastructure costs across the F-22 enterprise.

\*\*\*\*F-22 Squadrons, APAF/PE 0207138F/F2232B, includes funding for F-22 Increment 3.2B BPs 11 (Aircraft Modifications) and 16 (Initial Spares) only.

**D. Acquisition Strategy**

The (REDI) II contract is a follow-on Indefinite Delivery/Indefinite Quantity contract to the initial REDI contract. REDI II provides maximum flexibility to manage various modernization projects. The REDI II contract allows 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 (OFF) upgrades, and associated efforts essential to accomplishing the F-22 mission.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2017 Air Force		<b>Date:</b> February 2016
<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674788 / <i>F-22 Tactical Mandates</i>

**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 2017 Air Force** **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / F-22A Squadrons	<b>Project (Number/Name)</b> 674788 / F-22 Tactical Mandates
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<b>Product Development (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
F-22 Tactical Mandates	SS/CPIF	Lockheed Martin : Ft Worth, TX	0.000	2.963	Mar 2015	53.325	Jan 2016	101.294	Jan 2017	0.000		101.294	429.332	586.914	-
<b>Subtotal</b>			0.000	2.963		53.325		101.294		0.000		101.294	429.332	586.914	-

<b>Support (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
<b>Subtotal</b>			-	-		-		-		-		-	-	-	-

<b>Test and Evaluation (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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 Execution	Various	Various : Various	0.000	0.000		0.000		0.000		0.000		0.000	0.000	0.000	-
<b>Subtotal</b>			0.000	0.000		0.000		0.000		0.000		0.000	0.000	0.000	-

<b>Management Services (\$ in Millions)</b>				FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 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			
<b>Subtotal</b>			-	-		-		-		-		-	-	-	-

	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		0.000	2.963	53.325	101.294	0.000	101.294	429.332	586.914	-

**Remarks**



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**Exhibit R-4A, RDT&E Schedule Details:** PB 2017 Air Force **Date:** February 2016

<b>Appropriation/Budget Activity</b> 3600 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0207138F / <i>F-22A Squadrons</i>	<b>Project (Number/Name)</b> 674788 / <i>F-22 Tactical Mandates</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
TACLink 16 Development , Integration & Test	2	2017	1	2020
TACLink 16 Milestone B	1	2018	1	2018
TACLink 16 Milestone C	1	2019	1	2019
TACLink 16 Installs	2	2020	4	2021
F-22 Tactical Mandates Requirements Analysis	4	2015	3	2016
F-22 Tactical Mandates System Requirements Review/System Design Review (SRR/SDR)	3	2016	3	2016
F-22 Tactical Mandates Design	3	2016	1	2018
F-22 Tactical Mandates Development , Integration & Test	2	2017	1	2021
F-22 Tactical Mandates Preliminary Design Review (PDR)	4	2017	4	2017
F-22 Tactical Mandates Milestone B	1	2018	1	2018
F-22 Tactical Mandates Milestone C	4	2019	4	2019
F-22 Tactical Mandates Installs	1	2021	4	2021

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