Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Defense Advanced Research Projects Agency	Date: February 2016
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*

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	-	123.292	173.631	182.327	-	182.327	156.089	169.521	184.156	189.156	-	-
AIR-01: *ADVANCED AEROSPACE SYSTEMS*	-	123.292	173.631	182.327	-	182.327	156.089	169.521	184.156	189.156	-	-

A. Mission Description and Budget Item Justification

The Advanced Aerospace Systems program element is budgeted in the Advanced Technology Budget Activity because it addresses high pay-off opportunities to dramatically reduce costs associated with advanced aeronautical systems and provide revolutionary new system capabilities for satisfying current and projected military mission requirements. Research and development of integrated system concepts, as well as enabling vehicle subsystems will be conducted. Studies conducted under this project include examination and evaluation of emerging aerospace threats, technologies, concepts, and applications for missiles, munitions, and vehicle systems.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	129.723	185.043	193.011	-	193.011
Current President's Budget	123.292	173.631	182.327	-	182.327
Total Adjustments	-6.431	-11.412	-10.684	-	-10.684
• Congressional General Reductions	0.000	-1.394			
• Congressional Directed Reductions	0.000	-10.018			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-2.480	0.000			
• SBIR/STTR Transfer	-3.951	0.000			
• TotalOtherAdjustments	-	-	-10.684	-	-10.684

Change Summary Explanation

FY 2015: Decrease reflects reprogrammings and the SBIR/STTR transfer.
FY 2016: Decrease reflects congressional reduction and for Section 8024, FFRDC.
FY 2017: Decrease reflects completion of several Tactically Exploited Reconnaissance Node (TERN) program milestones.

C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Tactically Exploited Reconnaissance Node (TERN)	44.558	32.000	12.000
Description: The goal of the Tactically Exploited Reconnaissance Node (TERN) program, a joint effort with the Office of Naval Research, is to develop a systems approach for, and perform technical demonstration of, a Medium-Altitude, Long-Endurance			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Unmanned Aerial Vehicle (MALE UAV) capability from smaller ships. The program will demonstrate the technology for launch and recovery of large unmanned aircraft capable of providing persistent 24/7 Intelligence, Surveillance, and Reconnaissance (ISR) and strike capabilities at long radius orbits. By extending the ISR/strike radius and simultaneously increasing time on station beyond current capabilities from smaller ships, TERN will enable novel operational concepts including maritime surveillance and responsive, persistent deep overland ISR and strike, without requirement for forward basing. To achieve these goals, the program will create new concepts for aircraft launch and recovery, aircraft logistics and maintenance, and aircraft flight in regimes associated with maritime operating conditions. The program will culminate in a launch and recovery demonstration. Application of TERN technologies and operational concepts will enable a novel and cost efficient approach for multiple mission sets. The transition partner is the Navy. ***FY 2015 Accomplishments:*** - Continued technology maturation and completion of preliminary design. - Continued integrated aircraft risk reduction simulation and testing. - Initiated subscale bench testing of propulsion system. - Commenced integrated ship-aircraft simulation activity. - Initiated software in the loop / hardware in the loop design. - Conducted large-scale demonstration of select technology development elements. ***FY 2016 Plans:*** - Complete high fidelity integrated ship-aircraft simulation. - Commence procurement of long-lead demonstrator system components. - Complete detailed design of demonstrator aircraft. - Begin fabrication and testing of demonstrator system hardware. - Initiate software in the loop / hardware in the loop build. - Complete integrated testing of propulsion subsystem. - Initial testing of ship relative navigation system. - Perform subsystem risk reduction demonstrations. ***FY 2017 Plans:*** - Conduct demonstrator system Critical Design Review (CDR). - Commence demonstrator system wing and fuselage fabrication. - Perform demonstrator system integrated avionics testing. - Conduct integrated propulsion system testing. - Complete vehicle structure tooling. - Conduct vehicle structure assembly and testing.			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Conduct demonstrator system assembly ground checkout.			
Title: Collaborative Operations in Denied Environment (CODE)	19.000	28.543	29.027

Description: The goal of the Collaborative Operations in Denied Environment (CODE) program is to enhance mission performance, reduce cost, confound adversaries, and reduce reliance on space assets for navigation and communication by distributing mission functions such as sensing, communication, precision navigation, kinetic, and non-kinetic effects to small platforms and increasing their level of autonomy. Collaboration of multiple assets offers new possibilities to conduct military missions using smaller air platforms to enhance survivability, reduce overall acquisition cost, create new effects, increase communications range and robustness in denied environments, increase search area, increase areas held at risk, reduce target prosecution reaction time, and provide multi-mission capabilities by combinations of assets. This effort will specifically focus on developing and demonstrating approaches that will expand the mission capabilities of legacy air assets through autonomy and collaborative behaviors, within a standard based open architecture. Potential transition partners include the Air Force, Army, and Navy.

FY 2015 Accomplishments:
- Performed trade studies and decomposed selected missions.
- Developed collaborative algorithms, autonomous tactics, concepts for communication, and supervisory interface.
- Developed software module specifications compliant with standard based open architecture including OSD unmanned aircraft system control segment and other standards when applicable.
- Evaluated algorithms, tactics, communication and interfaces, in high fidelity faster-than-real time simulation against key performance objectives.

FY 2016 Plans:
- Implement algorithms in first release of flightworthy software (release 1) hosted in mission computer compatible with demonstration platform and objective operational platforms.
- Modify demonstration platform to include mission computer and mesh network capable radio.
- Demonstrate in-flight capabilities of release 1 focused on basic software functionality verification, initial autonomy modules including formation flight, GPS denied navigation, and other vehicle level autonomy modules such as on-board real time sensor processing, contingency management, and mission planning.
- Demonstrate release 1 collaboration algorithms in real time simulation, including low bandwidth sensor fusion and collaborative tasking that maximizes system effectiveness.
- Develop collaborative algorithms, tactics, concepts for communication, and human interface.
- Evaluate algorithms, tactics, communication and interfaces, in non-real time simulation.

FY 2017 Plans:

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Continue development of collaborative algorithms. - Select algorithms for the current leading capabilities: collaborative navigation without GPS, formation flight, simultaneous time of arrival from multiple azimuth against moving targets, dynamic prioritized target re-assignment to compensate for attrition, synchronized search using multiple sensor types, collaborative communication using relays or other techniques, closed loop tracking and identification, and terse communication protocols for data fusion and task allocation. - Continue software maturation through progressive software releases. - Validate software in hardware in the loop testing that includes mesh network, mission computer, mission sensors, and high fidelity air vehicle simulator. - Validate major software release 2 and 3 in flight with increasing number of real and virtual unmanned airplanes. - Collaborate with operational system owners and other partners to develop early transition opportunities.			
Title: Hypersonic Air-breathing Weapon Concept (HAWC)	5.500	13.500	49.500
Description: The Hypersonic Air-breathing Weapon Concept (HAWC) program is a Joint DARPA / Air Force effort that will develop and demonstrate technologies to enable transformational changes in responsive, long-range strike against time-critical or heavily defended targets. HAWC will pursue flight demonstration of the critical technologies for an effective and affordable air-launched hypersonic cruise missile. These technologies include advanced air vehicle configurations capable of efficient hypersonic flight, hydrocarbon scramjet-powered propulsion to enable sustained hypersonic cruise, thermal management approaches designed for high-temperature cruise, and affordable system designs and manufacturing approaches. HAWC technologies also extend to reusable hypersonic air platforms for applications such as global presence and space lift. The HAWC program will leverage advances made by the previously funded Falcon, X-51, and HyFly programs. This is a joint program with the Air Force, and HAWC technologies are planned for transition to the Air Force after flight testing is complete. ***FY 2015 Accomplishments:*** - Continued risk reduction testing of subsystem technologies for hypersonic air-breathing missile demonstrator. - Completed technology demonstration system requirements review and began preliminary design of hypersonic air-breathing missile flight demonstration system. - Initiated full-scale freejet propulsion system design and fabrication. - Initiated detailed plans for flight testing of the air-breathing missile demonstration system. ***FY 2016 Plans:*** - Complete preliminary design of hypersonic air-breathing missile flight demonstration system. - Complete full-scale freejet propulsion system testing. - Begin fabrication and testing of thermal protection system materials. - Begin detailed design of the hypersonic air-breathing missile flight demonstration system. - Begin creating test-validated performance databases to anchor demonstration vehicle design.			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Continue detailed plans for flight testing of the air-breathing missile demonstration system. ***FY 2017 Plans:*** - Continue updating test-validated performance databases to anchor demonstration vehicle design. - Complete critical design of hypersonic air-breathing missile flight demonstration system. - Conduct preliminary traceability assessment between the HAWC demonstration system and the HAWC operational system. - Complete software architecture and algorithm design. - Begin software-in-the-loop testing for the demonstration vehicle. - Begin procurement of long lead hardware for hypersonic air-breathing missile flight demonstration vehicle. - Initiate flight certification reviews with the test range. - Begin hardware-in-the-loop testing for the flight demonstration vehicle. - Initiate full-scale flight-like freejet engine testing. - Continue detailed plans for flight testing of the air-breathing missile demonstration system.			
Title: Tactical Boost Glide ***Description:*** The Tactical Boost Glide (TBG) program is a Joint DARPA / Air Force effort that will develop and demonstrate technologies to enable air-launched tactical range hypersonic boost glide systems, including flight demonstration of a vehicle that is traceable to an operationally relevant weapon that can be launched from current platforms. The program will also consider traceability to, and ideally compatibility, with the Navy Vertical Launch System (VLS). The metrics associated with this objective include total range, time of flight, payload, accuracy, and impact velocity. The program will address the system and technology issues required to enable development of a hypersonic boost glide system considering (1) vehicle concepts possessing the required aerodynamic and aero-thermal performance, controllability and robustness for a wide operational envelope, (2) the system attributes and subsystems required to be effective in relevant operational environments, and (3) approaches to reducing cost and improving affordability for both the demonstration system and future operational systems. TBG capabilities are planned for transition to the Air Force and the Navy. ***FY 2015 Accomplishments:*** - Completed TBG Concept of Operations (ConOps), Operational System conceptual design reviews and system capability documentation. - Completed TBG Demonstration System conceptual design and systems requirements reviews. - Completed initial Technology Maturation Plans (TMPs). - Completed initial Risk Management Plans (RMP). - Conducted initial test range and range safety coordination. - Began Phase I aerodynamic and aerothermal concept testing. - Began development of first generation aero databases.	15.100	11.200	22.800

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Completed aerodynamic and aerothermal Government Reference Vehicle (GRV) risk reduction testing. - Completed booster range and energy management study. - Selected booster and launch platforms. ***FY 2016 Plans:*** - Complete operational analysis of the performer TBG operational systems. - Complete operational analysis of evolved Government Reference Vehicle (GRV). - Select TBG demonstration test range. - Complete Phase I aerodynamic and aerothermal concept testing. - Complete first generation aero databases. - Continue risk reduction testing. - Develop initial flight test plan. - Update TMPs and RMPs. - Complete Preliminary Design Reviews (PDR). - Complete initial range safety documentation. ***FY 2017 Plans:*** - Begin TBG concept refinement testing. - Continue risk reduction testing. - Complete second generation aero databases. - Complete Critical Design Review (CDR). - Begin procurement of hardware for demonstration vehicles. - Begin hardware in the loop (HWIL), software in the loop (SIL), and qualification testing. - Begin Assembly, Integration, and Test (AI&T). - Continue detailed flight test and range safety planning, coordination, and documentation.			
Title: Advanced Aerospace System Concepts	6.360	6.000	3.000
Description: Studies conducted under this program examine and evaluate emerging aerospace technologies and system concepts for applicability to military use. This includes the degree and scope of potential impact/improvements to military operations, mission utility, and warfighter capability. Studies are also conducted to analyze emerging aerospace threats along with possible methods and technologies to counter them. The feasibility of achieving potential improvements, in terms of resources, schedule, and technological risk, is also evaluated. The results from these studies are used, in part, to formulate future programs or refocus ongoing work. Topics of consideration include: methods of defeating enemy anti-aircraft attacks; munition technologies to increase precision, range, endurance, and lethality of weapons for a variety of mission sets; novel launch systems; air vehicle control, power, propulsion, materials, and architectures; and payload and cargo handling systems.			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
FY 2015 Accomplishments: - Completed hypersonic propulsion integration and flowpath assessments. - Performed study of rotating detonation engine operation with hydrocarbon fuels, including system design and operational concepts. - Initiated studies of emerging concepts. ***FY 2016 Plans:*** - Perform feasibility experiments of candidate technologies and system concepts. - Conduct trade studies and modeling and simulation for novel technologies. ***FY 2017 Plans:*** - Validate sub-system performance and conduct sub-system risk reduction testing. - Conduct enabling technology and sub-system feasibility experiments.			
Title: Technology for Enriching and Augmenting Manned - Unmanned Systems	-	9.588	-
Description: The Technology for Enriching and Augmenting Manned - Aircraft (TEAM-US) project seeks to increase lethality, survivability, payload, and reach of combat aircraft by: (i) teaming them (wingmen) with advanced Unmanned Aerial Vehicles (UAVs), and (ii) enabling swarming employment and operations of manned and unmanned airborne systems. The synergy between the mission tailored UAV wingmen and the less survivable, but decision making manned platforms will provide access to contested airspace and enhance force projection. UAV wingmen will reduce air dominance lifecycle costs by dramatically reducing training costs. Legacy manned platforms will train with virtual unmanned teammates saving operations, maintenance, and logistics costs associated with manned wingmen. Unmanned wingmen can be developed for a wide variety of missions including penetrating intelligence, surveillance, and reconnaissance (ISR), electronic attack (EA), and weapons delivery. Mixed operations of manned and unmanned systems in a swarming configuration can be developed to support missions against networked-integrated air defenses and to support operations in highly contested environments. A common core will enable reduced development and integration costs. Finally, leveraging existing platforms for command, control, and battle management recapitalizes existing investments, making these 4th and 5th generation platforms viable participants in future anti-access, area denial scenarios where they may have limited survivability. Balancing in situ battle management with highly capable, mission specific unmanned teammates will offset new threat technologies, enabling more cost effective mission execution, and increasing the survivability of the manned platform team leader. The anticipated transition partners for this effort are the Air Force, Army, and Marine Corps. ***FY 2016 Plans:*** - Perform operational analysis and technology maturity assessments to determine the minimum set of critical platform attributes and technology advances required of an unmanned teammate.			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Create a technology development and system attributes demonstration roadmap. - Develop and refine the final unmanned vehicle design and concept.			
Title: Vertical Take-Off and Landing (VTOL) Technology Demonstrator	-	58.800	52.000
Description: The Vertical Take-Off and Landing (VTOL) Technology Demonstrator program will demonstrate revolutionary improvements in (heavier than air) VTOL air vehicle capabilities and efficiencies through the development of subsystem and component technologies, aircraft configurations and system integration. The program will build and flight test an unmanned 10,000 - 12,000 lb aircraft capable of sustained speeds in excess of 300 kt, demonstrate system level hover efficiency within 25 percent of the ideal power loading, and a lift-to-equivalent drag ratio no less than ten. Additionally, the demonstrator will be designed to have a useful load of no less than 40 percent of the gross weight with a payload capacity of at least 12.5 percent of the gross weight. A strong emphasis will be placed on the development of elegant, multi-functional subsystem technologies that demonstrate net improvements in aircraft efficiencies to enable new and vastly improved operational capabilities. Technologies developed under this program will be made available to all Services for application to future air systems development. This program is a continuation of applied research efforts funded in PE 0602702E, Project TT-07. The anticipated transition partners for this effort are the Army, Marine Corps, and Special Operations Forces. ***FY 2016 Plans:*** - Flight test and analyze data from a sub-scale vehicle demonstrator (~340 lb). - Continue preliminary design refinements leading toward detailed design of the demonstrator aircraft and associated subsystems. - Select performer for detailed design, fabrication, and flight test. - Complete preliminary design reviews of configuration and all subsystems. - Refine system design and initiate subsystem critical design reviews. - Initiate software design and flight control law development and simulation. - Develop detailed airworthiness and flight test preparation requirements in support of the full-scale technology demonstrator. - Perform subsystem testing necessary for subsystem design validation and critical design reviews. - Initiate aircraft assembly and manufacturing processes to include tooling design and fabrication. - Procure long-lead items for aircraft fabrication. ***FY 2017 Plans:*** - Complete detailed sub- and system-level validation and verification tests and analyses. - Perform hardware/software-in-the-loop testing. - Complete vehicle management system development and avionics requirements, as well as all elements of ground control and operator/pilot stations. - Complete flight test range selection and finalize flight test plans.			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Complete test and evaluation of all elements and sub-systems of the aircraft. - Fabricate and assemble the full, complete aircraft with integrated systems and subsystems.			
Title: Distributed Fires (DFires) ***Description:*** The goal of the Distributed Fires (DFires) program is to create a capability which would allow for precision fires from extended ranges to be rapidly accessed for use. The DFires system would be a stand-alone system that would be transported by trucks, rotorcraft, or boats and delivered to supporting locations on the battlefield. The modular launcher unit would provide the communications link and pass along targeting commands to the onboard stores. The onboard stores would consist of multiple tube launched munitions. Technology areas to be developed include the overall system architecture, the communications requirements and protocols, and specific stores. The anticipated transition partners for this effort are the Army, Marine Corps, and Special Operations Forces. ***FY 2016 Plans:*** - Identify critical anti-access/area-denial theaters of operation. - Conduct trade space analysis and develop overall system architecture. - Assess target value, conduct preliminary design of multiple types of onboard stores. - Explore new technologies which could reduce vehicle size, enhance penetration capability (propulsion and avionics). ***FY 2017 Plans:*** - Conduct Systems Requirements Review (SRR). - Develop system concept of operations (CONOPS) and command and control (C2).	-	6.000	5.000
Title: Advanced Full Range Engine (AFRE) ***Description:*** The Advanced Full Range Engine (AFRE) program will establish the feasibility of hypersonic aircraft propulsion through a two-pronged approach. AFRE will demonstrate turbine to Dual Mode Ramjet (DMRJ) transition of a Turbine-Based Combined Cycle (TBCC) propulsion system utilizing an off-the-shelf turbine engine. Large scale components of this complex propulsion system will be developed and demonstrated independently, followed by a full-scale freejet TBCC propulsion system mode transition ground test. Accomplishing these objectives will enable future hypersonic systems resulting in transformational changes in long range strike, high speed Intelligence, Surveillance and Reconnaissance (ISR) and Two-Stage-To-Orbit (TSTO) operations. ***FY 2017 Plans:*** - Begin preliminary design of the TBCC transition demonstration propulsion system, and develop ground test and associated technology development plans. - Design, fabricate, and initiate large scale dual-inlet testing.	-	-	9.000

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Design, fabricate, and initiate large-scale direct-connect combustor testing, - Initiate procurement of the turbine engine.			
Title: Aerial Reconfigurable Embedded System (ARES)	18.000	8.000	-
Description: Current and future land and ship-to-shore operations will require rapid and distributed employment of U.S. forces on the battlefield. The Aerial Reconfigurable Embedded System (ARES) program developed a vertical take-off and landing (VTOL), modular unmanned air vehicle that can carry a 3,000 lb useful load at a range of 250 nautical miles on a single tank of fuel. ARES enabled distributed operations and access to compact, high altitude landing zones to reduce warfighter exposure to hostile threats and bypass ground obstructions. ARES modular capability allowed mission modules to be quickly interchanged and deployed at the company level. This enables the flexible employment of many different capabilities including: cargo resupply, casualty evacuation, reconnaissance, weapons platforms, and other types of operations. ARES vehicles could be dispatched to resupply isolated small units. ARES was suited for enhanced company operations concepts that would provide the warfighter/ team increased situational awareness for operations in an urban environment. The enabling technologies of interest developed under the ARES program included vertical and translational flight, conversion between powered lift and wing borne lift, ducted fan propulsion systems, lightweight materials, tailless configuration, modularity, and advanced over-actuated flight controls for stable transition from vertical to horizontal flight. Additionally, the program explored opportunities for the design, development, and integration of new, key technologies and capabilities. These included adaptable landing gear concepts to enable operations from irregular landing zones and moving launch/recovery platforms, and autonomous take off and landing. The anticipated transition partners for this effort are the Army, Marine Corps, and Special Operations Forces.			
FY 2015 Accomplishments: - Completed assembly of drive train components for testing. - Completed assembly of airframe structure for load testing. - Completed proof load testing with flight hardware. - Completed review and revision of rotor control components. - Completed fabrication and assembly of revised rotor control components. - Completed drive train testing with flight components. - Completed development of flight control software to ensure successful flight and ground testing. - Conducted subsystem testing and integration of components into the full scale prototype ARES system. - Completed hardware-in-the-loop and software-in-the-loop testing with fully integrated full scale prototype ARES system. - Conducted ground demonstrations of the prototype vehicle in preparation for flight testing.			
FY 2016 Plans:			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Conduct flight tests to demonstrate that the vehicle meets program objectives by flying with and without a cargo module to show cargo delivery, and validate flight envelope by expanding speed and altitude performance.			
Title: Persistent Close Air Support (PCAS) ***Description:*** The Persistent Close Air Support (PCAS) program significantly increased close air support (CAS) capabilities by developing a system to allow continuous CAS availability and lethality to the supported ground commander. The enabling technologies were: manned/unmanned attack platforms, next generation graphical user interfaces, data links, digital guidance and control, and advanced munitions. PCAS demonstrated the ability to digitally task a CAS platform from the ground to attack multiple/simultaneous targets. PCAS allowed the Joint Tactical Air Controller (JTAC) the ability to rapidly engage multiple moving targets simultaneously within the area of operation. PCAS's ability to digitally task a CAS platform to attack multiple/simultaneous targets would improve U.S. ground forces operations and speed of attack. The system was designed to reduce collateral damage and potential fratricide to friendly forces. Transition partners include the Air Force, Special Operations Command (SOCOM), and the United States Marine Corps (USMC). ***FY 2015 Accomplishments:*** - Completed flight testing and live fire demonstration of PCAS prototype system on both an A-10C and MV-22. - Transitioned elements of PCAS air and ground systems to USMC and SOCOM. - Prepared and commenced PCAS integration into the MQ-1C. - Conducted testing of the PCAS prototype system on MQ-1C hardware.	14.774	-	-
Accomplishments/Planned Programs Subtotals	123.292	173.631	182.327

D. Other Program Funding Summary ($ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

F. Performance Metrics

Specific programmatic performance metrics are listed above in the program accomplishments and plans section.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Defense Advanced Research Projects Agency			Date: February 2016
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Tactically Exploited Reconnaissance Node (TERN)	C/CPFF	AeroVironment,Inc. : CA	-	13.035	Oct 2014	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Tactically Exploited Reconnaissance Node (TERN)	C/CPFF	NorthropGrumman : CA	-	17.209	Oct 2014	27.370		9.540		-		9.540	Continuing	Continuing	Continuing
Tactically Exploited Reconnaissance Node (TERN)	C/Various	Various : Various	-	10.202		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Collaborative Operations in Denied Environment (CODE)	C/Various	Various : Various	-	16.033		4.514		0.000		-		0.000	Continuing	Continuing	Continuing
Collaborative Operations in Denied Environment (CODE)	C/TBD	TBD : TBD	-	0.000		19.960		22.915		-		22.915	Continuing	Continuing	Continuing
Hypersonic Air-breathing Weapon Concept (HAWC)	C/Various	Various : Various	-	2.651		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Hypersonic Air-breathing Weapon Concept (HAWC)	C/TBD	TBD : TBD	-	0.000		10.585		43.045		-		43.045	Continuing	Continuing	Continuing
Tactical Boost Glide	C/CPFF	LockheedMartin : CA	-	6.159	May 2015	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Boost Glide	C/Various	Various : Various	-	2.936		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Boost Glide	C/TBD	TBD : TBD	-	0.000		8.692		17.048		-		17.048	Continuing	Continuing	Continuing
Advanced Aerospace System Concepts	C/Various	Various : Various	-	5.788		5.460		2.730		-		2.730	Continuing	Continuing	Continuing
Technology for Enriching and Augmenting Manned - Unmanned Systems	C/TBD	Various : Various	-	0.000		7.920		0.000		-		0.000	0	7.920	0
Vertical Take-Off and Landing (VTOL) Technology Demonstrator	C/TBD	Various : Various	-	0.000		53.008		45.170		-		45.170	Continuing	Continuing	Continuing
Distributed Fires (DFires)	C/TBD	Various : Various	-	0.000		5.995		4.550		-		4.550	Continuing	Continuing	Continuing
Advanced Full Range Engine (AFRE)	C/TBD	Various : Various	-	0.000		0.000		8.190		-		8.190	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Defense Advanced Research Projects Agency			Date: February 2016
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*	Project (Number/Name) AIR-01 / *ADVANCED AEROSPACE SYSTEMS*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Aerial Reconfigurable Embedded System (ARES)	C/CPFF	Lockheed Martin : TX	-	7.277	Mar 2015	0.000		0.000		-		0.000	0	7.277	0
Aerial Reconfigurable Embedded System (ARES)	C/Various	Various : Various	-	8.599		5.550		0.000		-		0.000	0	14.149	0
Persistent Close Air Support (PCAS)	C/Various	Various : Various	-	13.272		0.000		0.000		-		0.000	0	13.272	0
		Subtotal	-	103.161		149.054		153.188		-		153.188	-	-	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Support	MIPR	Various : Various	-	4.936		6.945		7.293		-		7.293	Continuing	Continuing	Continuing
		Subtotal	-	4.936		6.945		7.293		-		7.293	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Tactically Exploited Reconnaissance Node (TERN)	C/TBD	Various : Various	-	0.000		1.750		1.380		-		1.380	Continuing	Continuing	Continuing
Collaborative Operations in Denied Environment (CODE)	C/Various	Various : Various	-	1.257		1.500		3.500		-		3.500	Continuing	Continuing	Continuing
Hypersonic Air-breathing Weapon Concept (HAWC)	C/Various	Various : Various	-	2.354		1.700		2.000		-		2.000	Continuing	Continuing	Continuing
Tactical Boost Glide	C/Various	Various : Various	-	4.555		1.500		3.700		-		3.700	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Defense Advanced Research Projects Agency			Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*	**Project (Number/Name)** AIR-01 / *ADVANCED AEROSPACE SYSTEMS*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Vertical Take-Off and Landing (VTOL) Technology Demonstrator	C/TBD	Various : Various	-	0.000		0.500		2.150		-		2.150	Continuing	Continuing	Continuing
Aerial Reconfigurable Embedded System (ARES)	C/Various	Various : Various	-	0.504		2.000		0.000		-		0.000	0	2.504	0
Persistent Close Air Support (PCAS)	C/Various	Various : Various	-	0.355		0.000		0.000		-		0.000	0	0.355	0
		Subtotal	-	9.025		8.950		12.730		-		12.730	-	-	-

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Support	C/Various	Various : Various	-	6.170		8.682		9.116		-		9.116	Continuing	Continuing	Continuing
		Subtotal	-	6.170		8.682		9.116		-		9.116	-	-	-

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	123.292		173.631		182.327		-		182.327	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Defense Advanced Research Projects Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*	**Project (Number/Name)** AIR-01 / *ADVANCED AEROSPACE SYSTEMS*

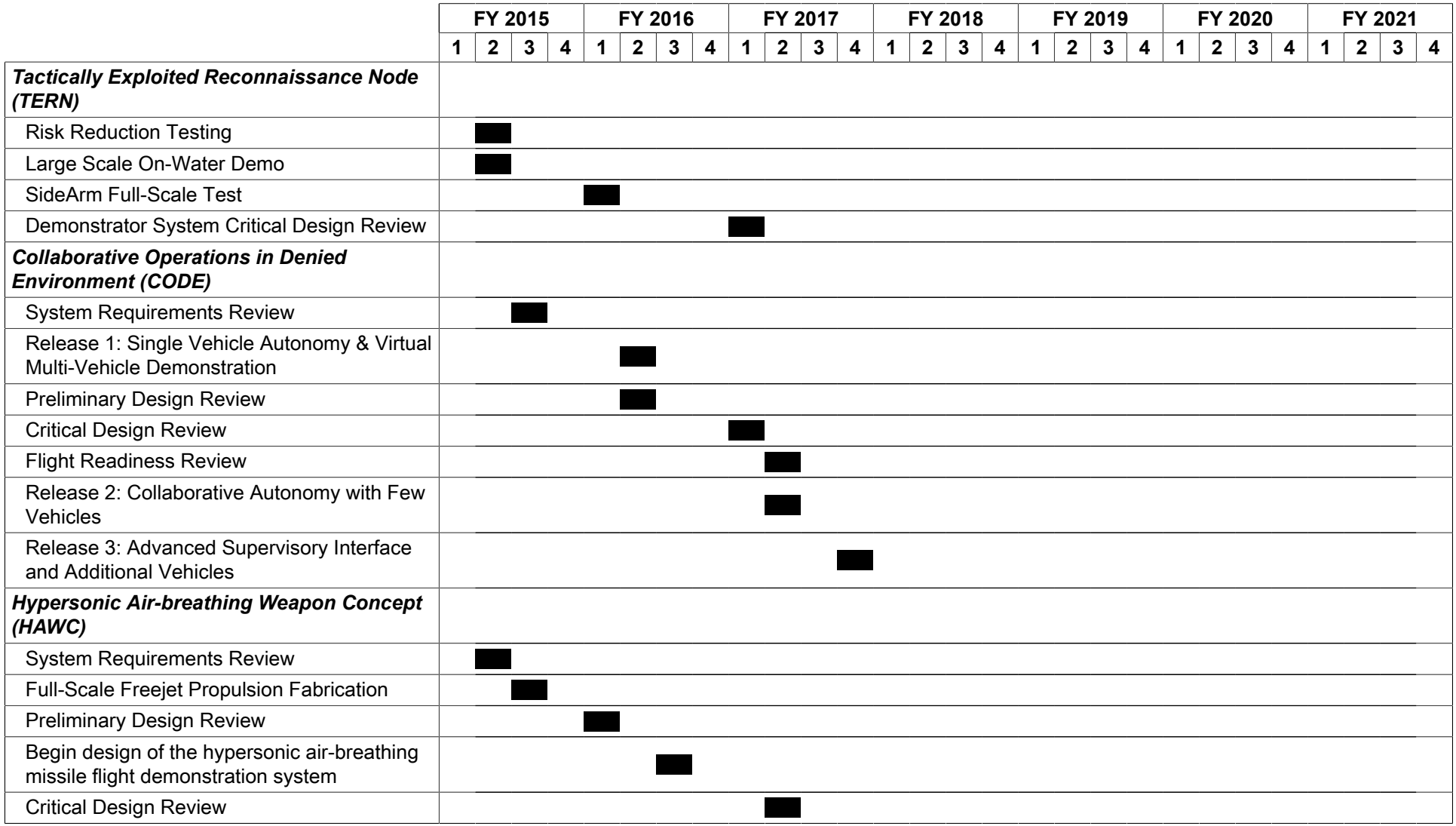

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Defense Advanced Research Projects Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*	**Project (Number/Name)** AIR-01 / *ADVANCED AEROSPACE SYSTEMS*

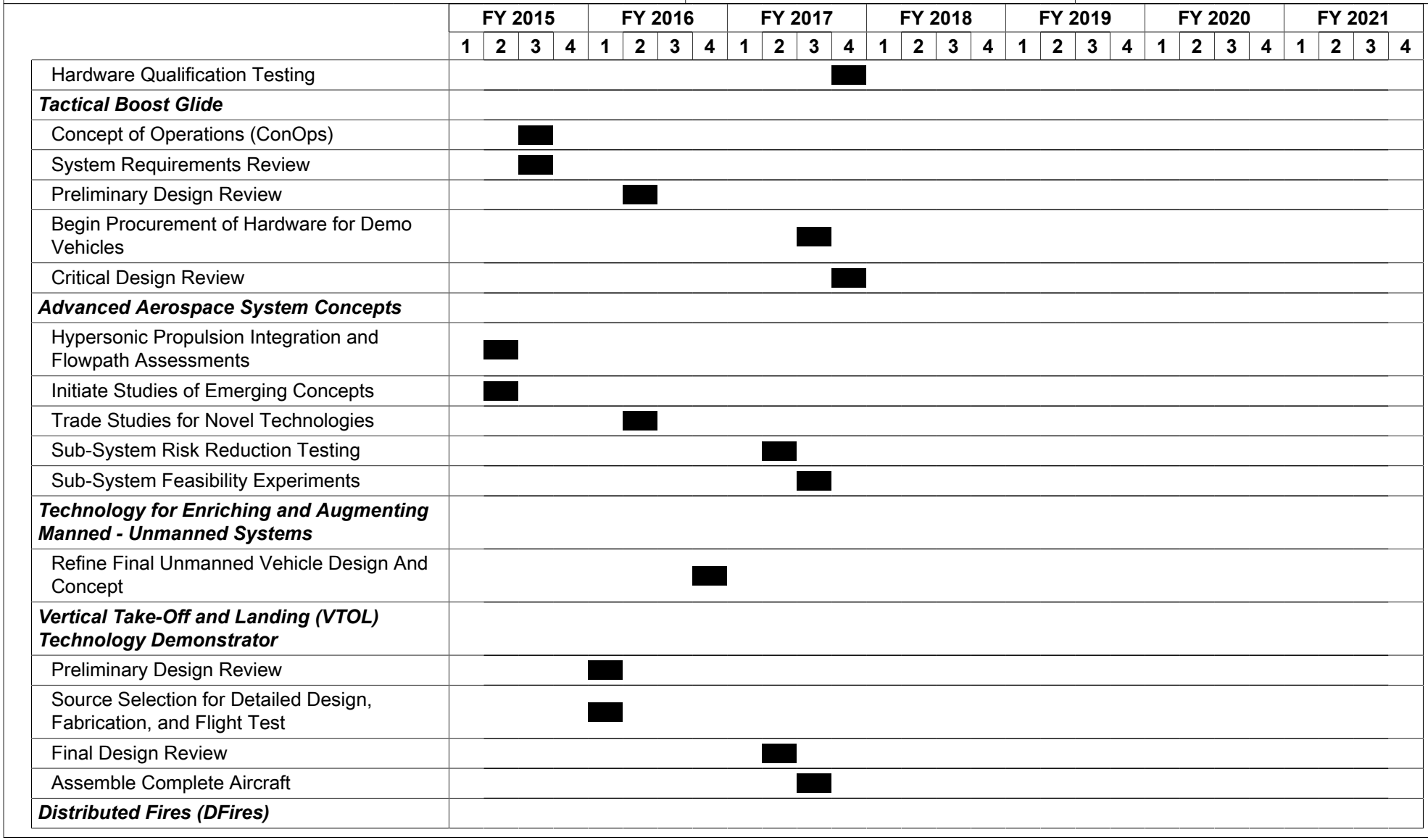

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Defense Advanced Research Projects Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*	**Project (Number/Name)** AIR-01 / *ADVANCED AEROSPACE SYSTEMS*

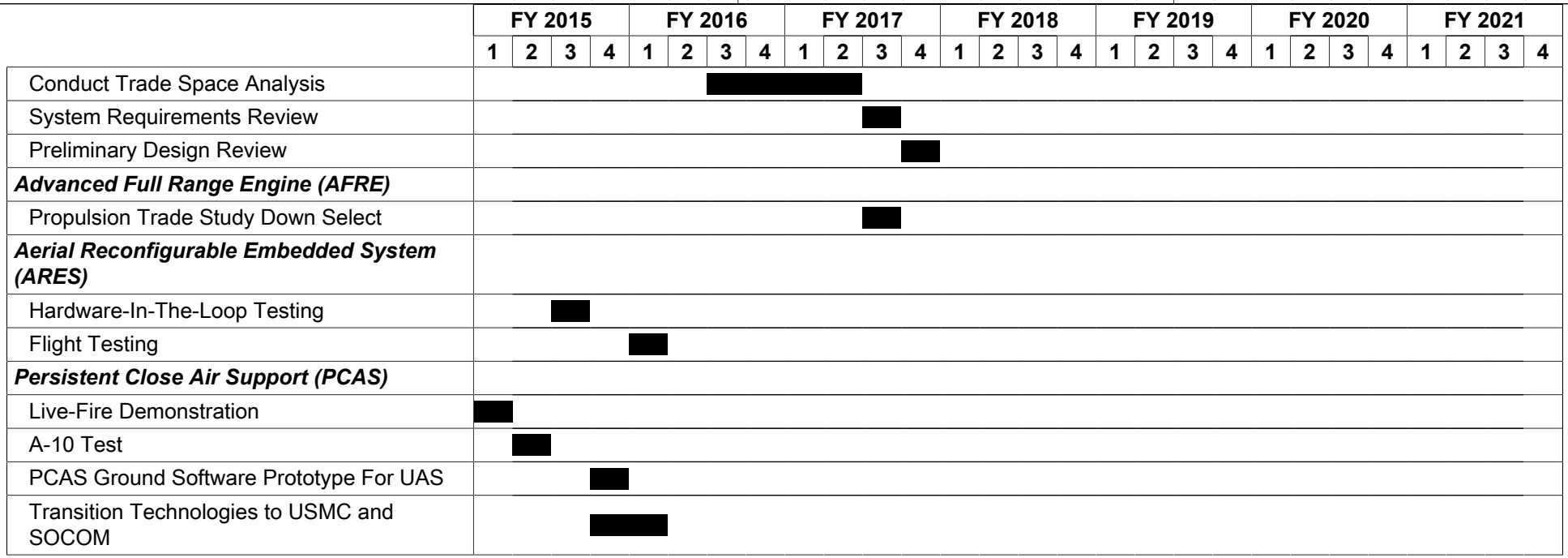

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Defense Advanced Research Projects Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*	**Project (Number/Name)** AIR-01 / *ADVANCED AEROSPACE SYSTEMS*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Tactically Exploited Reconnaissance Node (TERN)				
Risk Reduction Testing	2	2015	2	2015
Large Scale On-Water Demo	2	2015	2	2015
SideArm Full-Scale Test	1	2016	1	2016
Demonstrator System Critical Design Review	1	2017	1	2017
Collaborative Operations in Denied Environment (CODE)				
System Requirements Review	3	2015	3	2015
Release 1: Single Vehicle Autonomy & Virtual Multi-Vehicle Demonstration	2	2016	2	2016
Preliminary Design Review	2	2016	2	2016
Critical Design Review	1	2017	1	2017
Flight Readiness Review	2	2017	2	2017
Release 2: Collaborative Autonomy with Few Vehicles	2	2017	2	2017
Release 3: Advanced Supervisory Interface and Additional Vehicles	4	2017	4	2017
Hypersonic Air-breathing Weapon Concept (HAWC)				
System Requirements Review	2	2015	2	2015
Full-Scale Freejet Propulsion Fabrication	3	2015	3	2015
Preliminary Design Review	1	2016	1	2016
Begin design of the hypersonic air-breathing missile flight demonstration system	3	2016	3	2016
Critical Design Review	2	2017	2	2017
Hardware Qualification Testing	4	2017	4	2017
Tactical Boost Glide				
Concept of Operations (ConOps)	3	2015	3	2015

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Defense Advanced Research Projects Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*	**Project (Number/Name)** AIR-01 / *ADVANCED AEROSPACE SYSTEMS*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
System Requirements Review	3	2015	3	2015
Preliminary Design Review	2	2016	2	2016
Begin Procurement of Hardware for Demo Vehicles	3	2017	3	2017
Critical Design Review	4	2017	4	2017
Advanced Aerospace System Concepts				
Hypersonic Propulsion Integration and Flowpath Assessments	2	2015	2	2015
Initiate Studies of Emerging Concepts	2	2015	2	2015
Trade Studies for Novel Technologies	2	2016	2	2016
Sub-System Risk Reduction Testing	2	2017	2	2017
Sub-System Feasibility Experiments	3	2017	3	2017
Technology for Enriching and Augmenting Manned - Unmanned Systems				
Refine Final Unmanned Vehicle Design And Concept	4	2016	4	2016
Vertical Take-Off and Landing (VTOL) Technology Demonstrator				
Preliminary Design Review	1	2016	1	2016
Source Selection for Detailed Design, Fabrication, and Flight Test	1	2016	1	2016
Final Design Review	2	2017	2	2017
Assemble Complete Aircraft	3	2017	3	2017
Distributed Fires (DFires)				
Conduct Trade Space Analysis	3	2016	2	2017
System Requirements Review	3	2017	3	2017
Preliminary Design Review	4	2017	4	2017
Advanced Full Range Engine (AFRE)				
Propulsion Trade Study Down Select	3	2017	3	2017
Aerial Reconfigurable Embedded System (ARES)				
Hardware-In-The-Loop Testing	3	2015	3	2015

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Defense Advanced Research Projects Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603286E / *ADVANCED AEROSPACE SYSTEMS*	**Project (Number/Name)** AIR-01 / *ADVANCED AEROSPACE SYSTEMS*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Flight Testing	1	2016	1	2016
Persistent Close Air Support (PCAS)				
Live-Fire Demonstration	1	2015	1	2015
A-10 Test	2	2015	2	2015
PCAS Ground Software Prototype For UAS	4	2015	4	2015
Transition Technologies to USMC and SOCOM	4	2015	1	2016