Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army											Date: March 2023	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*							
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	-	255.323	272.551	158.795	-	158.795	165.415	176.397	170.614	181.828	0.000	1,380.923
AI8: *Alternative Concept Engine Advanced Technology*	-	3.689	2.038	-	-	-	-	-	-	-	0.000	5.727
AJ3: *Next Generation Rotorcraft Transmission Adv Tech*	-	1.353	-	-	-	-	-	-	-	-	0.000	1.353
AJ7: *Advanced Rotors Advanced Technology*	-	2.387	-	-	-	-	-	-	-	-	0.000	2.387
AJ9: *Integ Mission Equip for Vert Lift Systems Adv Tech*	-	23.037	25.066	17.095	-	17.095	3.391	-	-	-	0.000	68.589
AK3: *Aviation Survivability Advanced Technology*	-	3.821	4.103	-	-	-	-	-	-	-	0.000	7.924
AK5: *Multi-Role Small Guided Missile Advanced Tech*	-	5.653	11.209	11.795	-	11.795	7.093	-	-	-	0.000	35.750
AK7: *Adv Rotorcraft Armaments Protection Sys Adv Tech*	-	10.157	9.580	-	-	-	-	-	-	-	0.000	19.737
AK8: *Air Launched Effects Advanced Technology*	-	27.850	28.798	28.018	-	28.018	28.026	28.059	28.078	28.385	0.000	197.214
AL1: *Adv Teaming for Tactical Aviation Oper Adv Tech*	-	38.495	35.579	40.060	-	40.060	44.216	58.482	48.276	48.816	0.000	313.924
AL3: *HPC for Rotorcraft Applications Adv Tech*	-	4.888	-	-	-	-	-	-	-	-	0.000	4.888
AL7: *Full Spectrum Targeting Advanced Technology*	-	9.038	8.599	8.955	-	8.955	9.630	10.378	10.372	10.475	0.000	67.447
AL9: *Holistic Sit Awareness and Dec Making Adv Tech*	-	18.679	29.300	21.128	-	21.128	19.870	20.942	22.930	23.181	0.000	156.030
BP8: *Future Vertical Lift Air Platform Adv Tech (CA)*	-	82.500	94.750	-	-	-	-	-	-	-	0.000	177.250
CA8: *Adv Rotocraft Armaments Protection Sys*	-	1.189	2.862	6.388	-	6.388	1.254	4.169	10.312	12.850	0.000	39.024

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army										Date: March 2023		
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603465A *I Future Vertical Lift Advanced Technology*							
CC4: *FVL Radar Advanced Technologies*	-	3.854	3.342	4.403	-	4.403	-	2.384	2.387	2.413	0.000	18.783
CG1: *Holistic Team Survivability Adv Tech*	-	6.189	11.898	15.339	-	15.339	16.409	21.261	17.359	17.625	0.000	106.080
CH6: *Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech*	-	4.394	-	-	-	-	-	-	-	-	0.000	4.394
CH7: *Power & Thermal Management for FVL Adv Tech*	-	3.278	4.396	4.294	-	4.294	5.448	7.562	5.488	7.098	0.000	37.564
CH8: *UAS Survivability Adv Technology*	-	4.872	-	-	-	-	-	-	-	-	0.000	4.872
CI8: *Adaptive Avionics Advanced Technologies**	-	-	-	-	-	-	10.776	18.894	18.907	19.113	0.000	67.690
CJ5: *Future Vertical Lift Medical Advanced Technology*	-	-	1.031	1.320	-	1.320	1.593	1.595	1.598	1.602	0.000	8.739
CK2: *High Speed Maneuverable Missile (HSMM) Adv Tech**	-	-	-	-	-	-	17.709	2.671	4.907	10.270	0.000	35.557

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2024

A. Mission Description and Budget Item Justification

This Program Element (PE) matures and demonstrates manned and unmanned air vehicle and mission system technologies as well as advanced teaming capabilities to enable Army Future Vertical Lift. Emphasis is on platform and mission system technologies to enhance manned and unmanned air vehicle combat and combat support operations for attack, reconnaissance, air assault, survivability, logistics, and command and control missions. Within this PE, aviation technologies are advanced and integrated into realistic and robust demonstrations.

Research in this PE contributes to the Army Science and Technology (S&T) air systems portfolio and is fully coordinated with efforts in PE 0602148A (Future Vertical Lift Technology), PE 0602183A (Air Platform Applied Research) and PE 0603043A (Air Platform Advanced Technology).

A portion of this PE is directly aligned to the Future Vertical Lift (FVL) Army Modernization Priority.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering S&T focus areas and the Army Modernization Strategy.

Research in this PE is performed by the United States Army Futures Command (AFC) and the Army Engineering Research and Development Center (ERDC).

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army	Date: March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	261.880	177.836	170.020	-	170.020
Current President's Budget	255.323	272.551	158.795	-	158.795
Total Adjustments	-6.557	94.715	-11.225	-	-11.225
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	94.750			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.557	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-11.225	-	-11.225
• FFRDC Transfer	-	-0.035	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: BP8: *Future Vertical Lift Air Platform Adv Tech (CA)*		
Congressional Add: *Joint Tactical Aerial Resupply Vehicle*	8.000	-
Congressional Add: *Surface Tolerant Advanced Adhesives*	4.000	-
Congressional Add: *Program Increase - UH-60 Main Rotor Blade Modernization*	5.000	5.000
Congressional Add: *20MM Chaingun Development for FLRAA*	8.000	-
Congressional Add: *Air Launched Turbojet Missile*	15.000	-
Congressional Add: *Composite Structures*	5.000	-
Congressional Add: *Program Increase - Data Refinement and Optimization for Aviation Sustainment*	4.500	4.500
Congressional Add: *Degraded Visual Environment*	3.500	-
Congressional Add: *Digital Backbone*	5.000	-
Congressional Add: *Elastomeric Imaging*	3.000	-
Congressional Add: *Program Increase - Fleetspace Maintenance Tool*	4.500	5.250
Congressional Add: *Program Increase - Platform Digitization and Maintenance*	5.000	7.000
Congressional Add: *Program Increase - Stretch Broken Carbon Fiber*	10.000	10.000
Congressional Add: *Program Increase - UAS Fuel Systems Enhancements*	2.000	2.000
Congressional Add: *Program Increase - ADDITIVE MANUFACTURING CAPABILITY*	-	2.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army	Date: March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603465A *I Future Vertical Lift Advanced Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add: *Program Increase - ADDITIVE MANUFACTURING FOR FVL*	-	10.000
Congressional Add: *Program Increase - AUTONOMOUS CONFIGURATION MANAGEMENT AND AVIATION RECORDS*	-	10.000
Congressional Add: *Program Increase - DLC COATINGS FOR RED PHOSPHOROUS OBSCURANTS*	-	3.000
Congressional Add: *Program Increase - FVL SURFACE TOLERANT ADHESIVES*	-	9.000
Congressional Add: *Program Increase - INDIVIDUAL BLADE AND HIGHER HARMONIC CONTROL*	-	22.000
Congressional Add: *Program Increase - Multi-Drone, Multi-Sensor ISR*	-	5.000
Congressional Add Subtotals for Project: BP8	82.500	94.750
Congressional Add Totals for all Projects	82.500	94.750

Change Summary Explanation

Decreased funding to support higher priorities within the Science & Technology (S&T) portfolio.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AI8 / *Alternative Concept Engine Advanced Technology*	

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
AI8: *Alternative Concept Engine Advanced Technology*	-	3.689	2.038	-	-	-	-	-	-	-	0.000	5.727
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project provides demonstration of adaptable, fuel efficient, and high power to weight engine technologies for potential application to Future Vertical Lift platforms. Research includes development of alternative, adaptive and smart engine technologies to provide improved performance, readiness and affordability across the engine operating envelope for increased operational capability.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Alternative Concept Engine (ACE)	1.658	-	-
Description: This effort demonstrates alternative, adaptive, and intelligent engine technologies to provide improved / mission-optimized performance, readiness and affordability across an expanding engine envelope for increased operational capability for Future Vertical Lift (FVL) platforms. The alternative concept engine technology demonstrations planned for this effort are applicable to current and future platforms.			
Title: Improved Propulsion Technology Demonstration (IPTD)	2.031	2.037	-
Description: Effort will develop and execute an advanced engine integration, maintenance, and capability improvement strategy to produce key technology advancements on Future Long Range Assault Aircraft (FLRAA) engine systems, including the ACE engine technologies as appropriate. Full engine validation testing will be completed to TRL 6 providing improved propulsion system performance, maintainability, and durability while reducing integration risk for FVL FLRAA Platform.			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AI8 / *Alternative Concept Engine Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will perform engine technology trade-off analyses to optimize improvements in engine performance, weight, maintainability, and durability to meet FLRAA capability needs. Will perform advanced engine integration analyses to reduce engine integration risk onto FLRAA and enduring platforms. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This effort ends in FY23			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.001	-
Accomplishments/Planned Programs Subtotals	3.689	2.038	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AJ3 / *Next Generation Rotorcraft Transmission Adv Tech*	

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
AJ3: *Next Generation Rotorcraft Transmission Adv Tech*	-	1.353	-	-	-	-	-	-	-	-	0.000	1.353
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and ground demonstrates variable-speed transmission technologies that can be matured and integrated into the development of Future Vertical Lift (FVL) platforms.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: High Reduction-Ratio Transmission. ***Description:*** This effort will mature and demonstrate the technologies necessary for development, design, fabrication, and testing of a high reduction-ratio transmission in two stages or less (60:1 reduction ratio) with high efficiency and improved reliability against corrosion and seal leakage. Technology demonstrations from this effort will be applicable to FVL platforms.	1.353	-	-
Accomplishments/Planned Programs Subtotals	1.353	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AJ7 / *Advanced Rotors Advanced Technology*	

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
AJ7: *Advanced Rotors Advanced Technology*	-	2.387	-	-	-	-	-	-	-	-	0.000	2.387
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates and integrates new technologies that enable global and highly efficient/reliable operations for Future Vertical Lift (FVL) aircraft and Future Unmanned Aircraft Systems (FUAS) throughout the flight envelope.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: High Speed, Highly Efficient Rotors	2.387	-	-
Description: This effort demonstrates full scale, integrated rotor system technologies through the assessment of alternative designs aimed to satisfy future capability needs for FVL increased system durability, efficiency, speed, range, and payload. Technologies include: integrated high speed, low drag rotor technologies for high speed configurations; interactional aerodynamics tailoring between rotor and body & auxiliary lift/ propulsors; light weight, low volume, efficient and high authority EMAs; reliable and robust actuators/hubs/controls for IBC/swashplateless rotors; active/passive flow control; and automated track and balance.			
Accomplishments/Planned Programs Subtotals	2.387	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AJ9 / *Integ Mission Equip for Vert Lift Systems Adv Tech*	

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
AJ9: *Integ Mission Equip for Vert Lift Systems Adv Tech*	-	23.037	25.066	17.095	-	17.095	3.391	-	-	-	0.000	68.589
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a mission systems architecture to support Future Vertical Lift (FVL) through utilization of a reconfigurable and flexible tiered architectural approach.

This Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Integrated Mission Equipment for Vertical Lift Systems	23.037	24.278	17.095
Description: Develops and demonstrates a mission systems architecture to support FVL through utilization of a reconfigurable and flexible tiered architectural approach. The approach will consist of the following: Maturing and implementing Model Based Engineering methods and Modular Open Systems Architecture strategies; instantiating an architecture verification environment and developing an agile and resilient digital backbone to support the rapidly changing threat environment including the digital battleground.			
FY 2023 Plans: Mature and improve automation of AVE capabilities to validate and verify FY21 National Defense Authorization Act MOSA requirements. Demonstrate AVE capabilities to evaluate Future Vertical Lift and Enduring Fleet vendor designs for MOSA conformance. Demonstrate incremental airworthiness and cyber security qualification for infrastructure capabilities enabling affordability and faster to field for innovative integration. Demonstrate Digital Backbone A-Kit performance and ability to ease mission systems installation in an experimental UH-60M aircraft. Demonstrate third party integration of mission system components in the MSFTB lab.			
FY 2024 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AJ9 / *Integ Mission Equip for Vert Lift Systems Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will complete automation of AVE, demonstrate representative capability to verify MOSA requirements, transition specification and architecture repository. Will install and flight test digital backbone technologies on experimental UH-60M aircraft. Will integrate, install, and demonstrate multiple sets of mission system components using multiple third party integrators in the MSFTB lab and conduct flight test on experimental UH-60M aircraft. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease in FY24 reflects completion of aircraft modifications.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.788	-
Accomplishments/Planned Programs Subtotals	23.037	25.066	17.095

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AK3 / *Aviation Survivability Advanced Technology*	

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
AK3: *Aviation Survivability Advanced Technology*	-	3.821	4.103	-	-	-	-	-	-	-	0.000	7.924
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates increased Future Vertical Lift (FVL) survivability through the integration and demonstration of technologies that reduce platform signatures, improve threat warning and countermeasures against integrated networked air and ground threat systems. Also matures and demonstrates unmanned aircraft systems (UAS) survivability technologies to enable manned/unmanned team based approaches to enable operation in contested peer/near peer environments.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Survivability Against Integrated Networked Threats	3.821	3.953	-
Description: This effort increases rotorcraft survivability by reducing platform signatures, providing the means to more efficiently counter enemy detection and tracking systems			
FY 2023 Plans: Will continue to mature own-ship Aircraft Survivability Correlator capabilities and technologies. Will begin integration and ground testing of Aircraft Survivability Correlator software onto a surrogate FVL aircraft. Will demonstrate Aircraft own- ship Survivability Correlator at an open air range with surrogate threat systems to avoid and counter.			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding change reflects planned conclusion of this effort			
Title: SBIR/STTR Transfer	-	0.150	-
Description: Funding transferred in accordance with Title 15 USC §638			
FY 2023 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AK3 / *Aviation Survivability Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	3.821	4.103	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AK5 / *Multi-Role Small Guided Missile Advanced Tech*	

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
AK5: *Multi-Role Small Guided Missile Advanced Tech*	-	5.653	11.209	11.795	-	11.795	7.093	-	-	-	0.000	35.750
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a holistic lethality solution for current Army Aviation and Future Vertical Lift (FVL) Modernization Priority. This Project matures and demonstrates critical technology and designs components for future affordable rockets and missiles to provide overwhelming defeat of conventional and asymmetrical threats in all environments. Matures and demonstrates component technologies to enable an expeditionary short-to-medium range loitering maneuvering missile with man-in-the-loop capability for situational awareness, targeting, and lethal effects against hard and soft targets; and matures and demonstrates critical component technology and designs for future missiles that provide simultaneous multiple launch, control, and supervised autonomous terminal engagement of multiple missiles.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Multiple Simultaneous Engagement Technologies (MSET)	5.653	10.980	11.795
Description: Matures and demonstrates critical component technology and designs for future missiles that provide simultaneous multiple launch, control, and supervised autonomous terminal engagement of multiple missiles against stationary and moving hard/soft targets, image-based target discrimination/shared situation awareness/lock-on, and multi-missile control digital datalink with inter-missile cooperative networked communications. The end-state is a multi-missile Organic command and control (C2) solution that handles all aspects of sensor integration, fire control, and airspace management. This capability will support overwhelming lethal effects against anti-access/aerial denial (A2AD) / Integrated Air Defense Systems (IADS).			
FY 2023 Plans: Exercise flight hardware and software in the HWIL laboratory while simulating flight environments to demonstrate system performance and form predictions of outcome for simultaneous missile engagements, dynamic re-tasking of missiles in flight, target acquisition, terminal engagement, and operator workload. Continue high-fidelity simulation analyses against MSET			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AK5 / *Multi-Role Small Guided Missile Advanced Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
scenarios to verify subcomponent function and perform relevant trades to feed HWIL and flight test asset integration efforts. Use simulation and HWIL results to continue developmental flight tests to demonstrate and validate system performance. ***FY 2024 Plans:*** Will optimize and validate MSET HWIL and high-fidelity simulation using MSET hardware and software data from integrated flight demonstrations. Will mature and demonstrate MSET fire control, command and control (C2) communication for missile simultaneous engagements. Will mature and demonstrate MSET digital command link for missile to missile and C2 communications. Will mature and advance supervised autonomous target acquisition and terminal target engagement that enable a single user to launch and supervise simultaneous multi-missile engagements. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of effort.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.229	-
Accomplishments/Planned Programs Subtotals	5.653	11.209	11.795

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AK7 / *Adv Rotorcraft Armaments Protection Sys Adv Tech*	

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
AK7: *Adv Rotorcraft Armaments Protection Sys Adv Tech*	-	10.157	9.580	-	-	-	-	-	-	-	0.000	19.737
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project investigates and demonstrates a holistic lethality solution for Future Vertical Lift (FVL) offensive and defensive applications, focused on but not limited to Future Attack Reconnaissance Aircraft. Develop components for use in multi-role armament solutions for fire control, armament systems, munitions and integration of threat agnostic countermeasures.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Rotorcraft Armament and Protection System (ARAPS) - Future Attack Reconnaissance Aircraft (FARA)	9.572	6.557	-
Description: This effort matures and demonstrates a holistic medium caliber lethality solution for Future Vertical Lift offensive applications. Develops components for use in multi-role armament solutions for fire control, software, armament systems, and munitions. ***FY 2023 Plans:*** Will integrate medium caliber weapon with aviation specific fire control software. Will mature and demonstrate turreted medium caliber weapon platforms with targeting solution software for use in aviation systems including Future Vertical Lift Future Attack Reconnaissance Aircraft. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects planned conclusion of this effort.			
Title: ARAPS-Dispenser	0.585	2.733	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AK7 / *Adv Rotorcraft Armaments Protection Sys Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: This effort matures and demonstrates a dispenser countermeasure, a component of the holistic survivability solution for Future Vertical Lift defensive applications. Develop components for use in multi-role countermeasure solutions for fire control, software and countermeasure systems. ***FY 2023 Plans:*** Will optimize tracking and dispensing capabilities for countermeasure dispenser to increase survivability of current and future aviation platforms. Will mature capability of fire control systems with use of countermeasure dispenser. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease reflects planned conclusion of this effort.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.290	-
Accomplishments/Planned Programs Subtotals	10.157	9.580	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AK8 / *Air Launched Effects Advanced Technology*	

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
AK8: *Air Launched Effects Advanced Technology*	-	27.850	28.798	28.018	-	28.018	28.026	28.059	28.078	28.385	0.000	197.214
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and demonstrates the ability to launch an Unmanned Aircraft System (UAS) from a manned or unmanned Future Vertical Lift (FVL) aircraft at tactical altitudes and to control the UAS from the cockpit or a crew station; and assesses the enabled capabilities and determine their relevance to current Army Aviation engagement and survivability portfolios.

Research in this Project is fully coordinated with Program Element (PE) PE 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Air Launched Effects	27.850	27.884	28.018
Description: Develop and demonstrate the ability to launch a future unmanned aircraft system (FUAS) from FVL platform at tactical altitudes, and to control the UAS from the cockpit or a crew station. Assess the enabled capabilities and determine their relevance to current Army Aviation engagement and survivability portfolios. These air-launched FUAS will employ a variety of non-lethal effects including: electronic attack, decoy, and communications relay.			
FY 2023 Plans: Integrate electronic warfare (EW) payload and employment software into air launched effects air vehicle and evaluate ability to disrupt and jam threat systems using a single human supervising teams of air launched effects UAS through flight testing. Integrate secure, anti-jam communications payload into air launched effects UAS and evaluate effectiveness for Joint all-domain operations. Verify ability to rapidly insert software and payload technologies into the modular open systems approach (MOSA) based mission system architecture. Demonstrate team of Detect, Identify, Locate, and Report (DILR), Decoy, Disrupt, and Lethal air launched effects UAS, equipped with advanced teaming software, executing collaborative reconnaissance, surveillance, target			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AK8 / *Air Launched Effects Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
acquisition (RSTA), coordinated attack, decoy, and EW to disrupt or jam as a part of a multi-domain combined arms team through participation in Joint all-domain flight experiments. ***FY 2024 Plans:*** Will further mature and demonstrate decoy and disrupt electronic warfare (EW) air launched effects capabilities through multi-UAS behaviors and novel payloads. Will evaluate range and throughput capabilities of secure, anti-jam communications payloads during teamed flight operations. Will enhance mission systems and system hardening to align with A-CDD. Will demonstrate teams of Detect, Identify, Locate, and Report (DILR), Decoy, Disrupt, and Lethal air launched effects UAS, equipped with advanced teaming software, executing synchronized operations facilitating integrated air defense system (IADS) breach capability in contested conditions through participation in Joint All-Domain Operations. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease due to narrowing of effort scope to focus on maturing ALE-Small operational capabilities and targeted effects payloads.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.914	-
Accomplishments/Planned Programs Subtotals	27.850	28.798	28.018

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AL1 / *Adv Teaming for Tactical Aviation Oper Adv Tech*	

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
AL1: *Adv Teaming for Tactical Aviation Oper Adv Tech*	-	38.495	35.579	40.060	-	40.060	44.216	58.482	48.276	48.816	0.000	313.924
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates and drafts frameworks for autonomous teaming behaviors and autonomous decision making for Future Vertical Lift (FVL) and Future Unmanned Aircraft System (FUAS) platform formations in combined arms operations.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Teaming Demonstration	30.885	26.475	-
Description: Develop and demonstrate teaming behaviors and autonomous decision making for mixed FVL and FUAS platform formations in combined arms operations that are beyond current Manned-Unmanned Teaming (MUM-T) technologies. Focus areas include: resilient autonomous algorithms; self-organizing unmanned formations; distributed command and control; and navigation. This effort will also demonstrate multi-platform distributed apertures of multispectral sensors for threat detection and awareness and improved reliability through adaptation in autonomous systems.			
FY 2023 Plans: Mature and flight-demonstrate advanced teaming technologies integrated into mission systems architecture for real-time mission planning and synchronized execution of collaborative team reconnaissance, surveillance, target acquisition (RSTA), coordinated attack, decoy, and electronic warfare (EW) to disrupt or jam using mixed formations of manned and unmanned aircraft, including air launched effects, as a part of a multi-domain combined arms team through participation in Joint all-domain experiments. Test and evaluate autonomous in-stride replanning software that dynamically adapts battlefield situational awareness updates, network connectivity, and team member capability. Simulate autonomous team of teams operations facilitating integrated air defense			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL1 / *Adv Teaming for Tactical Aviation Oper Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
system (IADS) breach capability in contested conditions using mission representative vignettes. Further enhance and verify modular open systems integration approaches for rapidly upgradable and transitionable team autonomy. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This effort ends in FY23 and funding is realigned to Complex Advanced Teaming Operations within this project.			
Title: Sensors / Multi-Function Imagers for Future Aviation ***Description:*** Mature and demonstrate multi-function sensing system concepts to increase FVL manned platform survivability and situational awareness. This will enable the manned FVL platforms to engage in multi-domain advanced teaming operations and leverage autonomous behaviors of both manned and unmanned aviation platforms. This effort will enable tactical operations in complex environments (e.g. high threat, degraded visuals, and urban) through the use of sensing modules suitable for multiple tactical applications. The multifunction sensor approach will mitigate the need for separate dedicated threat warning and situational awareness imaging sensor modules, thus reducing the total cost and logistics burden for future aviation systems. ***FY 2023 Plans:*** Demonstrate digital readout integrated circuits integrated into multispectral camera modules for improved pilotage and threat warning capabilities. Validate multispectral sensing and threat warning capabilities against various signatures and clutter. Optimize digital readout frame integration, adjustable frame rate and image processing settings for improved camera performance in varying environments and concepts of operations. ***FY 2024 Plans:*** Will mature and optimize an aircraft-hardened multispectral multifunction camera using a proven digital readout integrated circuit for aerial threat warning and situational awareness data collection. Will mature multispectral sensing and threat warning capabilities and establish a threat warning performance baseline. Will conduct flight demonstration of flyable multispectral sensor in relevant environments. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.	7.610	8.125	8.486
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:***	-	0.979	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL1 / *Adv Teaming for Tactical Aviation Oper Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Funding transferred in accordance with Title 15 USC §638			
Title: Complex Advanced Teaming Operations	-	-	31.574
Description: Mature and demonstrate teaming behaviors and autonomous decision making for mixed FVL and FUAS platform formations in complex and contested operational environments. Focus includes maturing solutions that overcome unique challenges associated with autonomy, teaming, range, communication, navigation and mission operations in littoral and urban / fringe environments, while adhering to MOSA strategy for rapid insertion and affordability. ***FY 2024 Plans:*** Will adapt and enhance autonomy and teaming technologies for use in complex environment operations, specifically addressing range, navigation, and communication challenges; evaluate initial team dynamic retasking, reconfigurability, and mission execution capabilities within complex and contested operational environments; demonstrate autonomous team of teams synchronized operations facilitating integrated air defense system (IADS) breach capability in contested conditions through participation in Joint all-domain experiments. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** This effort begins in FY24 with funding realigned from Advanced Teaming Demonstration within this project.			
Accomplishments/Planned Programs Subtotals	38.495	35.579	40.060

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AL3 / *HPC for Rotorcraft Applications Adv Tech*	

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
AL3: *HPC for Rotorcraft Applications Adv Tech*	-	4.888	-	-	-	-	-	-	-	-	0.000	4.888
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and demonstrates the use of high-fidelity computational fluid dynamics for Future Vertical Lift (FVL) platforms through the utilization of Department of Defense (DoD) High- Performance Computing (HPC) and software tools for cutting-edge modeling and simulation, as well as adding software capabilities for workflow automation and design space exploration. Efforts in this Project are also applicable to the family of Future Vertical Lift (FVL) and Future Unmanned Aircraft System (FUAS) platforms.

Work in this Project is complements Program Element (PE) PE 0602148A (Future Vertical Lift Technology).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Engineered Resilient Systems (ERS) for Army Aviation	2.874	-	-
Description: This effort supports Future Vertical Lift by exploiting advancements in physics-based software tools to provide rapid engineering analysis of proposed rotorcraft platforms, providing high-fidelity computational modeling of candidate Future Attack Reconnaissance Aircraft (FARA) platforms during the FARA down-selection, increasing the speed of simulations by automating simulation setup and execution on DoD HPC systems, and maturing and demonstrating the use of advanced machine learning techniques for aviation datasets to inform both the development of FVL systems and current operations.			
Title: Engineered Resilient Systems (ERS) for Advanced Army Aviation Concepts	2.014	-	-
Description: This effort supports Future Vertical Lift (FVL) by utilizing advanced machine-assisted design algorithms to explore design spaces and choose resilient platform variants. Advanced computational techniques will leverage automated design processes to expand computational testbeds in support of testing and evaluation. Increase high accuracy physics in modeling and simulation to optimize platforms for all operational environments and mission scenarios. Provide multi-fidelity computational models of candidate Future Attack Reconnaissance Aircraft (FARA), Future Long-Range Assault Platforms (FLRAA), and Future Tactical Unmanned Aircraft Systems (FTUAS) platforms to support acquisition decision-makers.			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL3 / *HPC for Rotorcraft Applications Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Accomplishments/Planned Programs Subtotals	4.888	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AL7 / *Full Spectrum Targeting Advanced Technology*	

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
AL7: *Full Spectrum Targeting Advanced Technology*	-	9.038	8.599	8.955	-	8.955	9.630	10.378	10.372	10.475	0.000	67.447
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project demonstrates next generation targeting concepts for Future Vertical Lift (FVL) and Future Unmanned Aircraft System (FUAS) platforms.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Full Spectrum Targeting	9.038	8.418	8.955
Description: This effort will mature and demonstrate key targeting sensor system concepts to enable the FVL and FUAS modernization priorities. Effort will leverage advancements in laser, infrared imaging focal plane arrays, compact long-range optics, and multispectral system technologies to develop a stabilized, payload that can actively and/or passively image in multiple spectral bands simultaneously to provide robust targeting and situational awareness capabilities for the prevailing battlefield conditions. Effort will demonstrate the ability of multispectral sensing to autonomously scan areas of interest and identify tactical threats with reduced cognitive workloads through sensor fusion and automated spectral selection.			
FY 2023 Plans: Demonstrate improved threat detection range performance using a steerable turret with dual-band infrared sensor paired to novel, compact long-range optical components. Validate approaches for multispectral imaging to detect military targets in relevant environments. Optimize automated scanning and processing techniques in multiple spectral bands suitable for detection, recognition and identification (DRI) of FVL and FUAS relevant target sets. Optimize sensor fusion techniques and automatic selection of optimal spectral bands to reduce FVL and FUAS operator burden. Validate automated sensor scanning and DRI performance.			
FY 2024 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL7 / *Full Spectrum Targeting Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will provide assessment of long range optics performance against military targets in relevant environments. Will provide baseline sensor architecture specifications for steerable turret with dual-band infrared sensor paired with novel compact long-range optical components. Will validate performance of improved multi-band fused Aided Target Recognition (AiTR) algorithms. Will conduct payload demonstration of range performance, Degraded Visual Environment (DVE) capability, and automation of target recognition and acquisition times. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.181	-
Accomplishments/Planned Programs Subtotals	9.038	8.599	8.955

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) AL9 / *Holistic Sit Awareness and Dec Making Adv Tech*	

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
AL9: *Holistic Sit Awareness and Dec Making Adv Tech*	-	18.679	29.300	21.128	-	21.128	19.870	20.942	22.930	23.181	0.000	156.030
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates a pilotage and decision aiding system that allows for care free operations in complex and hostile environments through: demonstration of a comprehensive human machine interface for all situational awareness (SA) domains (terrain & obstacles, threat, weather, & environment); and demonstration of decision aiding technologies to reduce cognitive loading of air crews during operations in complex and hostile environments.

Research in this Project is fully coordinated with Program Element (PE) PE 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Holistic Situational Awareness and Decision Making	9.210	12.393	12.826
Description: This program directly contributes to Future Vertical Lift (FVL) to ensure Future Aircraft pilots have the necessary situational awareness, accurate understanding of the tactical mission, and ability to decide faster than our adversaries.			
FY 2023 Plans: Demonstrate FVL cockpit crew increased effectiveness and decreased workload when equipped with a situational awareness world model, decision aiding tools, pilot-on-the-loop autonomy, and multi-sensory cueing. Workload and effectiveness will be measured using both subjective and objective means including biometrics. Participate in Fiscal Year 2023 (FY23) Project Convergence through flight demonstration to assess this capability's impact in relevant mission scenarios.			
FY 2024 Plans: Will demonstrate an increase in FVL crew station effectiveness through pilot workload management scenarios that investigate scalable automation methods for select mission tasks while performing simulated combat missions. The automation will leverage an experimental situational awareness data model, and workload and effectiveness will be measured using both subjective and			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL9 / *Holistic Sit Awareness and Dec Making Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
objective means, including biometrics. Will participate in Fiscal Year 2024 (FY24) Project Convergence through flight simulation demonstration to assess this capability's impact in relevant mission scenarios. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Multi-function RF for FVL Platforms ***Description:*** This effort matures and demonstrates multi-function radio-frequency (RF) sensor technologies to support the FVL family of systems. It provides integrated software and hardware technologies that enable the use of common electronics and system components to support varied functions, such as enhanced situational awareness, threat-detection and localization, targeting, communications, and aircraft pilotage. This will result in improved performance for these critical functions and reduced requirements for size, weight, and power for mission equipment across FVL platforms. ***FY 2023 Plans:*** Develop multi-function RF components from derived technical specifications. Characterize the components in the laboratory and analyze their expected performance against the full set of mission requirements. Develop software to enable resource management of multiple RF functional modes. Complete design of the overall RF multi-function radio-frequency (RF) sensor system including hardware and software. ***FY 2024 Plans:*** Will utilize technical designs and analysis to mature multi-function RF sensor system hardware. Will demonstrate resource management of multiple RF functional modes and mode software on multi-function system hardware. Will validate performance of multi-function technology against relevant targets and current and emerging threats to support the FVL family of systems. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding decrease represents completion of initial engineering design and development of sensor system necessary to enable demonstrations of the multiple RF functional modes.	7.585	13.886	6.188
Title: Early Human Systems Integration Demonstrations ***Description:*** Human Systems Integration (HSI) analysis assesses and matures technologies to optimize pilot situational awareness and workload management, crew task automation and decision-aiding, information management, and advanced crew station interfaces. The objective of this effort is to reduce crew decision and task execution timelines in a tactically challenging mission environment. ***FY 2023 Plans:***	1.884	2.011	2.114

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL9 / *Holistic Sit Awareness and Dec Making Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Demonstrate effects of crew task automation, decision-aiding, and augmented pilot displays on Soldier performance and system effectiveness by conducting human performance and human-system interface analyses via simulations, modeling, and evaluation of advanced technologies; provide early (Advanced Technology Demonstration) assessment of HSI considerations for advanced crew station technology design, automation and decision-aiding, thereby reducing life-cycle costs; optimize HSI designs of highest priority Army technologies and systems including advanced crew station technology design and automation for enhanced Soldier performance and system effectiveness. In addition, demonstrate effects of decision aides, User Centered Design, more effective use of automation in command and control (C2), training and crew automation for accelerated expertise, design concepts to support rapid and enhanced sense-making, and a multilevel performance assessment in support of Air and Missile Defense. ***FY 2024 Plans:*** Will mature and demonstrate effects of dynamic information processing to enhance aircrew situational awareness, decision-making, and information management. Will assess and mature technologies for performance-based crew workload measurement and task automation, will assess impact of advanced technologies to enhance Soldier performance via large data analytics, and will assess and optimize advanced Soldier displays. Will demonstrate interface design extensions to support enhanced sense making and decision making in AMD C2 operations centers conducting multi-domain operations (MDO). Will develop and demonstrate a concept for supervised automation (supervisory control) in AMD C2 operations centers. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	1.010	-
Accomplishments/Planned Programs Subtotals	18.679	29.300	21.128

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** AL9 / *Holistic Sit Awareness and Dec Making Adv Tech*

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) BP8 / *Future Vertical Lift Air Platform Adv Tech (CA)*	

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
BP8: *Future Vertical Lift Air Platform Adv Tech (CA)*	-	82.500	94.750	-	-	-	-	-	-	-	0.000	177.250
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Congressional Interest Item funding provided for Future Vertical Lift Air Platform Advanced Technology.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding provided for Future Vertical Lift Air Platform Advanced Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
Congressional Add: Joint Tactical Aerial Resupply Vehicle	8.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Joint Tactical Aerial Resupply Vehicle		
Congressional Add: Surface Tolerant Advanced Adhesives	4.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for FVL Surface Tolerant Adhesives		
Congressional Add: Program Increase - UH-60 Main Rotor Blade Modernization	5.000	5.000
FY 2022 Accomplishments: Congressional Interest Item funding provided for UH-60 Main Rotor Blade Modernization		
FY 2023 Plans: Congressional Interest Item funding provided for UH-60 Main Rotor Blade Modernization		
Congressional Add: 20MM Chaingun Development for FLRAA	8.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for 20MM Chaingun Development for FLRAA		
Congressional Add: Air Launched Turbojet Missile	15.000	-
FY 2022 Accomplishments: Congressional Interest Item funding provided for Air Launched Turbojet Missile		
Congressional Add: Composite Structures	5.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** BP8 / *Future Vertical Lift Air Platform Adv Tech (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
FY 2022 Accomplishments: Congressional Interest Item funding provided for Composite Structures		
Congressional Add: Program Increase - Data Refinement and Optimization for Aviation Sustainment ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Data Refinement and Optimization for Aviation Sustainment ***FY 2023 Plans:*** Congressional Interest Item funding provided for Data Refinement and Optimization for Aviation Sustainment	4.500	4.500
Congressional Add: Degraded Visual Environment ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Degraded Visual Environment	3.500	-
Congressional Add: Digital Backbone ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Digital Backbone	5.000	-
Congressional Add: Elastomeric Imaging ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Elastomeric Imaging	3.000	-
Congressional Add: Program Increase - Fleetspace Maintenance Tool ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Fleetspace Maintenance Tool ***FY 2023 Plans:*** Congressional Interest Item funding provided for Fleetspace Maintenance Tool	4.500	5.250
Congressional Add: Program Increase - Platform Digitization and Maintenance ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Platform Digitization and Maintenance ***FY 2023 Plans:*** Congressional Interest Item funding provided for Platform Digitization and Maintenance	5.000	7.000
Congressional Add: Program Increase - Stretch Broken Carbon Fiber ***FY 2022 Accomplishments:*** Congressional Interest Item funding provided for Stretch Broken Carbon Fiber ***FY 2023 Plans:*** Congressional Interest Item funding provided for Stretch Broken Carbon Fiber	10.000	10.000
Congressional Add: Program Increase - UAS Fuel Systems Enhancements	2.000	2.000

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** BP8 / *Future Vertical Lift Air Platform Adv Tech (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
FY 2022 Accomplishments: Congressional Interest Item funding provided for UAS Fuel Systems Enhancements ***FY 2023 Plans:*** Congressional Interest Item funding provided for UAS Fuel Systems Enhancements		
Congressional Add: Program Increase - ADDITIVE MANUFACTURING CAPABILITY ***FY 2023 Plans:*** Congressional Interest Item funding provided for Additive Manufacturing Capability	-	2.000
Congressional Add: Program Increase - ADDITIVE MANUFACTURING FOR FVL ***FY 2023 Plans:*** Congressional Interest Item funding provided for Additive Manufacturing for FVL	-	10.000
Congressional Add: Program Increase - AUTONOMOUS CONFIGURATION MANAGEMENT AND AVIATION RECORDS ***FY 2023 Plans:*** Congressional Interest Item funding provided for AUTONOMOUS CONFIGURATION MANAGEMENT AND AVIATION RECORDS	-	10.000
Congressional Add: Program Increase - DLC COATINGS FOR RED PHOSPHOROUS OBSCURANTS ***FY 2023 Plans:*** Congressional Interest Item funding provided for DLC COATINGS FOR RED PHOSPHOROUS OBSCURANTS	-	3.000
Congressional Add: Program Increase - FVL SURFACE TOLERANT ADHESIVES ***FY 2023 Plans:*** Congressional Interest Item funding provided for FVL SURFACE TOLERANT ADHESIVES	-	9.000
Congressional Add: Program Increase - INDIVIDUAL BLADE AND HIGHER HARMONIC CONTROL ***FY 2023 Plans:*** Congressional Interest Item funding provided for Individual Blade and Higher Harmonic Control	-	22.000
Congressional Add: Program Increase - Multi-Drone, Multi-Sensor ISR ***FY 2023 Plans:*** Congressional Interest Item funding provided for Multi-Drone, Multi-Sensor ISR	-	5.000
Congressional Adds Subtotals	82.500	94.750

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** BP8 / *Future Vertical Lift Air Platform Adv Tech (CA)*

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) CA8 / *Adv Rotocraft Armaments Protection Sys*	

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
CA8: *Adv Rotocraft Armaments Protection Sys*	-	1.189	2.862	6.388	-	6.388	1.254	4.169	10.312	12.850	0.000	39.024
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project investigates and demonstrates a holistic lethality solution for Future Vertical Lift (FVL) offensive and defensive applications, focused on but not limited to Future Long Range Assault Aircraft (FLRAA). Develop components for use in multi-role armament solutions for fire control, armament systems, munitions and integration of threat agnostic countermeasures.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Rotorcraft Armanents Protection System-Future Long Range Assault Aircraft	1.189	2.824	6.388
Description: This effort matures and demonstrates a holistic small caliber lethality solution for FVL offensive applications. Integrates and demonstrates components for use in multi-role armament solutions for fire control, software, and armament systems.			
FY 2023 Plans: Mature use of holistic aviation fire control software and demonstrate fire control architecture and interfaces in conformance with FACE. Improve stabilized mount performance through sub-system level testing including modeling and simulation.			
FY 2024 Plans: Will optimize stabilized mount for weight, performance, size and power integration needs of future aviation platforms. Will demonstrate improved aviation armament system performance from an optimized weapon mount integrated on an air platform. Will validate improved weapon system accuracy and performance for future aviation platforms in a relevant environment.			
FY 2023 to FY 2024 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CA8 / *Adv Rotocraft Armaments Protection Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.038	-
Description: Funding transferred in accordance with Title 15 USC §638			
FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638			
FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	1.189	2.862	6.388

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) CC4 / *FVL Radar Advanced Technologies*	

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
CC4: *FVL Radar Advanced Technologies*	-	3.854	3.342	4.403	-	4.403	-	2.384	2.387	2.413	0.000	18.783
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops Next Generation Reconfigurable Radar Aperture for detection, tracking and precision targeting, navigation and fire control for both reconnaissance, surveillance, and target acquisition (RSTA) and intelligence, surveillance and reconnaissance (ISR).

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Multi-mission Airborne Radar	3.854	3.220	4.403
Description: Advanced Digital radio frequency (RF) processing integration with final demonstration subsystem and system level radar hardware and software designs. ***FY 2023 Plans:*** Mature design component characteristics documented in both preliminary and critical design reviews. Component designs as well as system level capability verification completed via component modeling and simulation as well as bench top demonstration. Demonstrate technology readiness level (TRL) 5 integrated components with a traditional tower test of radar modes. ***FY 2024 Plans:*** Will validate component integration into radar system level capability in a surrogate airframe body. Will conduct flight demonstration of all-weather, day/night, Detect, Identify, Locate, and Report (DILR) capability via a small form factor radar system and Automatic Target Recognition (ATR) capability on surrogate Air Launched Effects (ALE) platform. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer	-	0.122	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CC4 / *FVL Radar Advanced Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638			
Accomplishments/Planned Programs Subtotals	3.854	3.342	4.403

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) CG1 / *Holistic Team Survivability Adv Tech*	

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
CG1: *Holistic Team Survivability Adv Tech*	-	6.189	11.898	15.339	-	15.339	16.409	21.261	17.359	17.625	0.000	106.080
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates increased Future Vertical Lift (FVL) Family of Systems Survivability (FoS) in an advanced integrated air defense systems environment through a multi-layered approach. The approach focuses on maturing and demonstrating technologies for reducing aircraft susceptibility and vulnerability during pre-mission planning, mission execution (combat survivability and safety), and post-mission repair and return to service.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Advanced Radio Frequency Countermeasures	6.189	6.617	6.918
Description: This effort matures and demonstrates adaptive sensor and countermeasure technologies that provide platform protection against guided threats. It develops software and hardware to increase probability of detection and defeat of threats to aviation platforms using modeling and simulation (M&S), hardware in the loop (HIL) assessment, and field events. It provides integrated software and sensor technologies to counter the characteristics of advanced and agile threats.			
FY 2023 Plans: Demonstrate Radio Frequency (RF) payload via flight demonstration against multiple threat surrogates, concluding in a technology readiness level (TRL) assessment of RF payload. Further optimize RF payload for integration and test in the prototype Air Launched Effect (ALE) platform. Algorithms to optimize payload and platform behaviors will be tested in modeling and simulation environments with previously developed electronic warfare (EW) models for advanced teaming integration.			
FY 2024 Plans: Will exploit advances in chip-scale technology, enabling the replacement of high Size, Weight and Power-Cost, (SWAP-C) analog RF components with low SWAP-C semi-conductor components. Will mature and integrate these next-generation RF components into a payload with enhanced capability. Will improve payload performance against current and emerging threats and provide			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CG1 / *Holistic Team Survivability Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
technical models of the optimized payload. Will demonstrate improved algorithms and payload behaviors of the next-generation payload. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Holistic End to End Survivability ***FY 2023 Plans:*** Continue to expand Survivability Against integrated and Networked Threats, Survivability Correlator capabilities. Begin development of Crashworthiness/Crash predictive capabilities. Continue to develop and mature team based survivability architectures, behaviors and component technologies. ***FY 2024 Plans:*** Will continue to develop and mature team based survivability architectures, behaviors, and component technologies. Will conduct feasibility analysis of integration for Crashworthiness/Crash predictive capabilities into the Survivability Correlator software architecture. Will continue to maturate EO/IR coatings and RF materials for future manned and unmanned platform demonstration. Will continue maturation / demonstration of air vehicle vulnerability reduction technologies. Will demonstrate air-to-air recovery of UAS to host platform. Will continue to mature team based survivability architectures, behaviors, and component technologies. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase reflects additional investments in vulnerability reduction technologies for FVL FoS and the inclusion of unmanned aviation systems. Funding increase will allow for the investigation and development of microclimatology algorithms and behaviors for improved aviation system survivability and increased mission effectiveness.	-	4.980	8.421
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.301	-
Accomplishments/Planned Programs Subtotals	6.189	11.898	15.339

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CG1 / *Holistic Team Survivability Adv Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) CH6 / *Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech*	

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
CH6: *Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech*	-	4.394	-	-	-	-	-	-	-	-	0.000	4.394
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures, and demonstrates advanced autonomy, controls, and structures technologies that provide manned/unmanned Future Vertical Lift (FVL) platforms the decisive tactical overmatch of near-peer adversaries needed for combat mission success. Matures and demonstrates modeling capabilities, control law development, and handling quality criteria required for fully realizing capabilities of advanced configurations of Army aircraft. Develops and demonstrates structures technologies and mission-adaptive autonomy (MAA) and control algorithms that provide level 1 handling qualities, resilience to extreme and hostile environments, damage-mitigation by reconfiguration of redundant controls, increased agility and speed with minimal fatigue, increased payload and weight efficiency, optional pilotage and manned-unmanned teaming capabilities, cognitive off-loading, and reduction of structural maintenance burden.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Adaptive and Resilient Engineered Structures (ARES) Technology Demonstration ***Description:*** Mature, integrate, and demonstrate advanced structures technologies providing performance, survivability, and sustainment benefits with broad applicability across platform scale and role, enabling mission success for manned/unmanned FVL platforms in the contested environment of multi-domain operations.	3.322	-	-
Title: Adaptive Tactical Autonomy and Control (ATAC) Technology Demonstration ***Description:*** Mature, integrate, and demonstrate advanced vehicle management, flight control, and autonomy technologies that enable FVL aircraft to achieve superior maneuverability and agility at all speeds, effectively exploit extreme/degraded environmental conditions as a force multiplier, fight and win in presence of failure or damage, and operate on a cognitive-loading-spectrum from piloted to fully autonomous.	1.072	-	-
Accomplishments/Planned Programs Subtotals	4.394	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CH6 / *Adapt & Resilnt Tact Autnmy Cont & Struct Adv Tech*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) CH7 / *Power & Thermal Management for FVL Adv Tech*	

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
CH7: *Power & Thermal Management for FVL Adv Tech*	-	3.278	4.396	4.294	-	4.294	5.448	7.562	5.488	7.098	0.000	37.564
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and demonstrates at the system level, integrated electrical power technologies (including power generation, distribution, and control along with advanced energy storage) and thermal management technologies to provide significantly higher electrical power capability to Future Vertical Lift (FVL) aircraft while addressing consequential size, weight, pulsed power, and thermal issues. Provides power capability for advanced electric aeromechanical effectors, advanced mission systems that for example, execute algorithms for route planning and teaming, and for advanced survivability and electronic warfare capability. Will demonstrate software-in-the-loop performance of power & thermal management technologies to provide significantly higher electrical power capability to FVL aircraft while addressing consequential SWAP-C & thermal issues.

Research in this Project is fully coordinated with Program Element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Optimized Energy for C5ISR Platforms Advanced Technology	1.845	2.005	2.042
Description: Enable advanced Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) and survivability systems on FVL platforms through component development of improved high power and energy storage technologies, higher capacity lower Size, Weight, and Power (SWaP) cooling systems, and more efficient electrical architectures			
FY 2023 Plans: Optimize control schemes for electrical power systems to safely and effectively deliver power when and where it is needed on FVL aircraft. Iimprove performance of energy storage systems through lighter packaging and improved controls. Maximize energy and power density through use of hybrid schemes sized to support load demands.			
FY 2024 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CH7 / *Power & Thermal Management for FVL Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Will mature and demonstrate electrical power controls that will optimize the availability and efficiency of electrical power sources, including batteries and power generation for power on FVL aircraft; optimize for both performance and safety of energy storage systems through improved packaging for aviation applications. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: Power & Thermal Management Tech Demo ***Description:*** Exploits fabrication, and systems integration lab validation testing to Technical Readiness Level (TRL) 6 of power and thermal management technologies to provide significantly higher electrical power capability to FVL aircraft while addressing thermal issues and reducing system weight/volume ***FY 2023 Plans:*** Continue to mature the power and thermal management system components which includes design integration efforts to optimally incorporate advanced system components into a power and thermal management system, providing increased electrical power capability while reducing weight, volume, and cost to Future Vertical Lift aircraft and the enduring fleet. Perform fabrication of advanced power and thermal management system components to be used in component level and system level validation efforts. ***FY 2024 Plans:*** Will continue fabrication of advanced power and thermal management system components and begin fabrication/modification of the systems integration laboratory to be used in component level and system level validation efforts; conduct component level and system level validation efforts, ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.	1.433	2.310	2.252
Title: SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 Plans:*** Funding transferred in accordance with Title 15 USC §638 ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC §638	-	0.081	-
Accomplishments/Planned Programs Subtotals	3.278	4.396	4.294

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CH7 / *Power & Thermal Management for FVL Adv Tech*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) CH8 / *UAS Survivability Adv Technology*	

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
CH8: *UAS Survivability Adv Technology*	-	4.872	-	-	-	-	-	-	-	-	0.000	4.872
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project integrates the new technologies of Future Vertical Lift and Air Platform Technologies to address an evolving threat environment by improving Unmanned Aircraft System (UAS) survivability in contested environments. This is achieved without impacting UAS performance through tailored signature management for UAS missions, survivability-enhanced mission profiles, UAS survivability behaviors, resilient systems and architectures and electromagnetic (EM) vulnerability reduction. UAS Survivability Advanced Technology will mature UAS survivability technologies and demonstrate increased UAS Survivability in a peer / near-peer environment with minimal impacts to aircraft performance.

This research supports Future Vertical Lift and Advanced Unmanned Aircraft Systems.

Research in this Project is fully coordinated with Program element (PE) 0602148A (Future Vertical Lift Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States (US) Army Futures Command (AFC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: UAS Survivability Demonstration	4.872	-	-
Description: This effort focuses on maturing UAS susceptibility and vulnerability reduction technologies to provide increased UAS survivability with minimum impacts to mission performance and UAS system cost and addresses the evolving threat environment to support the Maneuver Force within the Multi-Domain Battle concept. Will develop and demonstrate increased UAS Survivability in a peer / near-peer environment with minimal impacts to aircraft performance, with objectives of tailored signature management for UAS missions, survivability-enhanced mission profiles, UAS survivability behaviors, resilient systems/architectures, and EM vulnerability reduction.			
Accomplishments/Planned Programs Subtotals	4.872	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CH8 / *UAS Survivability Adv Technology*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603465A / *Future Vertical Lift Advanced Technology*	Project (Number/Name) CJ5 / *Future Vertical Lift Medical Advanced Technology*	

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
CJ5: *Future Vertical Lift Medical Advanced Technology*	-	-	1.031	1.320	-	1.320	1.593	1.595	1.598	1.602	0.000	8.739
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project evaluates, validates, matures and delivers medical guidelines and strategies to assure optimal Soldier performance and protection on the future technologically-intensive battlefield. Key elements of the program include: 1) tailored medical selection and retention standards for Future Vertical Lift (FVL); 2) medical strategies to maintain and enhance human performance in Multi-domain operations (MDO); 3) human-centered technology design guidance to accommodate the range of aircrew; 4) improved protection standards to reduce FVL occupant injury; and 5) operator state monitoring tools to enable scalable autonomy in FVL aircraft.

Efforts in this Project further develop work done in Program Element 0602148A (Future Vertical Lift Technology) / Project BZ7 (Future Vertical Lift Medical Technologies).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: Biomedical Strategies to Support Design and Operation of Future Vertical Lift (FVL) Aircraft	-	1.026	1.320
Description: This effort evaluates, validates, matures and delivers medical guidelines and strategies to assure optimal Soldier performance and protection on the future technologically-intensive battlefield. Key elements of the program include: 1) tailored medical selection and retention standards for FVL; 2) medical strategies to maintain and enhance human performance in MDO.); 3) human-centered technology design guidance to accommodate the range of aircrew; 4) improved protection standards to reduce FVL occupant injury; and 5) operator state monitoring tools to enable scalable autonomy in FVL aircraft.			
FY 2023 Plans: Will validate Health Hazard Assessment methods and criteria to protect FVL occupants from Head Supported Mass, impulsive noise/ shock, and repeated jolt to maintain FVL occupant performance and prevent injury. Will validate human variables for operator state assessment and mature a holistic aircrew workload/ performance stress model. Validate recommendations for Anthropomorphic Test Device (ATD) use in military environments. Validate revised spinal fracture thresholds and FVL aviator/ crew seat requirements. Validate standards for assessing flight helmet stability and crash retention.			
FY 2024 Plans: Will validate recommended holistic HSM limits for injury and performance. Will validate human variables for operator state assessment and mature a holistic aircrew workload/ performance stress model. Will validate proposed responses of			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603465A / *Future Vertical Lift Advanced Technology*	**Project (Number/Name)** CJ5 / *Future Vertical Lift Medical Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
autonomous system to FVL aircrew. Will validate package for enhanced FVL crashworthiness. Efforts in this task further develop work done in Program Element 0602148A, Project BZ7. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding change reflects planned lifecycle of this effort.			
Title: SBIR/STTR Transfer ***FY 2023 Plans:*** SBIR/STTR Transfer ***FY 2023 to FY 2024 Increase/Decrease Statement:*** SBIR/STTR Transfer	-	0.005	-
Accomplishments/Planned Programs Subtotals	-	1.031	1.320

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A