Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602183A *I Air Platform Applied Research*							
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
Total Program Element	-	40.372	48.163	53.206	-	53.206	59.078	57.223	57.450	57.284	0.000	372.776
CL5: *Air Platform Enabling University Applied Research*	-	0.872	0.526	0.959	-	0.959	1.294	1.296	1.310	1.323	0.000	7.580
CL8: *Aviation Teaming Autonomy Concepts & Technologies*	-	4.093	4.249	4.387	-	4.387	4.392	4.395	4.444	4.488	0.000	30.448
CN1: *Disruptive Countermeasure Concepts for Aviation*	-	7.342	7.546	7.668	-	7.668	7.245	7.249	7.328	7.401	0.000	51.779
CU7: *Control & Autonomy for Tactical Superiority Tech*	-	4.321	4.796	5.783	-	5.783	8.404	10.467	9.985	10.858	0.000	54.614
CU8: *Structures Tech for Enduring Efficient Resilience*	-	1.588	1.682	1.048	-	1.048	1.050	1.050	1.061	1.072	0.000	8.551
CU9: *Systems Design Technology*	-	2.996	3.135	4.435	-	4.435	5.237	5.345	5.405	5.459	0.000	32.012
CW3: *Advanced Rotors Applied Technology*	-	2.495	2.614	2.015	-	2.015	2.017	2.650	2.678	2.705	0.000	17.174
CW4: *Air Vehicle Structures and Dynamics Tech*	-	2.876	3.042	3.078	-	3.078	3.083	3.085	3.119	3.150	0.000	21.433
CW5: *Experimental and Computational Aeromechanics Tech*	-	6.359	6.835	6.918	-	6.918	6.927	6.930	7.007	7.077	0.000	48.053
CW6: *Future UAS Propulsion Technology*	-	3.289	3.560	3.602	-	3.602	3.605	3.608	3.647	3.683	0.000	24.994
CW7: *High Speed and Efficient VTOL Vehicle Tech*	-	1.492	1.580	1.583	-	1.583	1.585	1.587	1.604	1.620	0.000	11.051
CW8: *Next Generation Aviation Transmission Apl Tech*	-	1.428	1.511	-	-	-	-	-	-	-	0.000	2.939

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army												Date: March 2024
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602183A *I Air Platform Applied Research*							
DC2: *High Performance Computing for Rotorcraft Apl Tech*	-	1.221	1.293	1.309	-	1.309	1.311	1.312	1.326	1.339	0.000	9.111
DE2: *Airborne Threat Defeat*	-	-	5.794	7.423	-	7.423	6.505	-	-	-	0.000	19.722
DK1: *Air Vehicle Integrated & Alternative Tech (AVIATe)*	-	-	-	2.998	-	2.998	6.423	8.249	8.536	7.109	0.000	33.315

Note

Air Vehicle Integrated & Alternative Tech (AVIATe) is a new start within the Air Platform Applied Research program in FY 2025.

A. Mission Description and Budget Item Justification

This Program Element (PE) undertakes applied research efforts that support and enable the overall Army Aviation portfolio in general, and the Army's modernization priority for future vertical lift (FVL). Vital and enduring applied research is conducted in the air portfolio that supports mid-to-long term requirements in contested operational environments and technologies that have broad application to FVL modernization, as well as overall Army and specific Department of Defense (DoD) aviation needs.

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 0603465A (Future Vertical Lift Advanced Technology) and PE 0603043A (Air Platform Advanced Technology).

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

B. Program Change Summary ($ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	41.588	48.163	42.393	-	42.393
Current President's Budget	40.372	48.163	53.206	-	53.206
Total Adjustments	-1.216	0.000	10.813	-	10.813
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.001	-			
• SBIR/STTR Transfer	-1.217	-			
• Adjustments to Budget Years	-	-	10.813	-	10.813

Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army	Date: March 2024
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602183A *I Air Platform Applied Research*

Change Summary Explanation

In Fiscal Year (FY) 2025 a portion of this Program Element (PE) was realigned from PE 0603465A (Future Vertical Lift Advanced Technology), Project AL1 (Advanced (Adv) Teaming for Tactical Aviation Operations (Oper) Advanced (Adv) Technology (Tech) and Program Element (PE) 0602148A (Future Vertical Lift Technology), Project CH2 (Air Launched Effects Technology) and realigned from PE 0602183A (Air Platform Applied Research) / Project CW8 (Next Generation Aviation Transmission Applied (Apl) Tech).

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) CL5 / *Air Platform Enabling University Applied Research*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CL5: *Air Platform Enabling University Applied Research*	-	0.872	0.526	0.959	-	0.959	1.294	1.296	1.310	1.323	0.000	7.580

A. Mission Description and Budget Item Justification

This Project focuses on applied research originating from extramural applied research in academia pertaining to navigation/routing, autonomous robotic vehicles, artificial intelligence and machine learning as applied to aerial mobility and maneuver, holistic survivability, teaming, integrated mission systems, air-launched effects, and other innovative air enabling applied research technologies that will accelerate the Army modernization in next generation aerial vehicles. This Project will perform discovery research efforts to focus more on mid to far-term Army modernization priorities while also maintaining delivery of near-term technologies fundamental to the modernization priorities. This Project conducts applied research and development leading to all the potential emerging technologies in areas of strategic importance to Army Aviation in artificial intelligence / machine learning (AI/ML), autonomous teaming systems, survivability, aeromechanics, advanced vertical take-off and landing(VTOL) design & concepts, flight dynamics, vibration & noise control, propulsion, human factor engineering and structures & materials, etc., by bringing competitively selected Universities with research and development teams into Technical Alliances. The Project will also continuously experiment with methods to identify, demonstrate and transition novel technology from entities that might not otherwise collaborate with the Department of Defense (DoD), with the end goal of accelerating the adoption of cutting-edge applied research technology for the warfighter in the Army aviation portfolio.

Work in this Project complements Program Element (PE) 0602148A (Future Vertical Lift Technology), PE 0603465A (Future Vertical Lift Advanced Technology Development), PE 0603043A (Air Platform Advanced Technology) and PE 0602144A (Ground Technology).

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

Work in this Project is performed by the University Technology Development Division.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Vertical Lift Applied Research	0.872	0.526	0.959
Description: Conduct applied research in academia to elevate Vertical Lift research and continue to investigate promising and emerging technologies			
FY 2024 Plans: Will continue to conduct applied research in rotorcraft emerging technologies through autonomous teaming systems, aeromechanics, advanced VTOL design & concepts, flight dynamics models to extend reach, and agility.			
FY 2025 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CL5 / *Air Platform Enabling University Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will fund research to develop capabilities to enable the coordination of multiple land and air vehicles participating in an unmanned long-term reconnaissance operation using distributed command/control architecture despite communication delays and/or failures; fund research to conduct academic applied research in rotorcraft emerging technologies through autonomous teaming systems, aeromechanics, advanced Vertical Takeoff and Landing (VTOL) design & concepts, flight dynamics models to extend reach, and agility. The benefit of this effort is it enables future vertical lift capability improvements. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is consistent with the planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	0.872	0.526	0.959

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*				Project (Number/Name) CL8 / *Aviation Teaming Autonomy Concepts & Technologies*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
CL8: *Aviation Teaming Autonomy Concepts & Technologies*	-	4.093	4.249	4.387	-	4.387	4.392	4.395	4.444	4.488	0.000	30.448

A. Mission Description and Budget Item Justification

This Project establishes multi-level simulations, physics-based models, and artificial intelligence/machine learning (AI/ML) algorithms and methods to inform and advance capabilities for heterogeneous advanced teaming concepts to support operations in complex and peer contested environments. Innovative solutions, knowledge, and understanding generated from this effort informs Program Element (PE) 0602148A Future Vertical Lift Technology / Project AK9 (Adv Teaming for Tactical Aviation Operations Tech).

Research in this Project is fully coordinated with PE 0602148A (Future Vertical Lift Technology) and PE 0603465A (Future Vertical Lift Advanced Technology Development), Project AL1 (Adv Teaming for Tactical Aviation Oper Adv Tech).

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.

Work in this Project is performed by Army Research Laboratory (ARL).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2023**	**FY 2024**	**FY 2025**
Title: Intelligent Unmanned Aerial System Teaming Technologies	4.093	4.249	4.387
Description: Enables the establishment of component technologies to support resilient, multi-modal, survivable Unmanned Aircraft System (UAS) teams that can plan and act on time-scales beyond human capability and have a robust shared understanding of contested and dynamic environments to support effective tactical engagement. Specific topics include 1) novel artificial-intelligence algorithms and methods for adaptive team composition and control, 2) increased team knowledge base and understanding of local and global world models, 3) hierarchical, composable, and adaptive learning methods for increased mission resilience, and 4) understanding interaction and scalability between, amongst, and across heterogeneous team members and the environment.			
FY 2024 Plans: Will develop multi-agent tactics for autonomous teams of unmanned air vehicles to autonomously detect, identify, locate, and report radio frequency (RF) signals of opportunity. Will develop multi-agent tactics, path planning, and controls for tethered UAS teams. Will develop multi-agent behaviors for executing cooperative localized tasks. Will implement machine learning on the battery management system to achieve improved performance over multiple charging/discharging cycles. Will investigate novel			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CL8 / *Aviation Teaming Autonomy Concepts & Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
UAS vertical take-off and landing (VTOL) design for increased endurance and effects on optimization algorithms for mission planning under fixed energy constraints. ***FY 2025 Plans:*** Will validate multi-agent seek and strike on defended radio frequency (RF) emitting targets in field experiments deploying small unmanned aerial systems (UAS); validate collaborative and deceptive behaviors to penetrate adversary defenses; assess the relative performance of analytically derived and machined-learned algorithms; sustain multi-target engagement with energy-aware autonomy algorithms; refine development of multi-agent tactics for autonomous teams of unmanned air vehicles to autonomously detect, identify, locate, and report RF signals of opportunity; assess improved sub-system and system level models on mission energy aware planning algorithms; implement wind and terrain awareness into coordinated UAS - unmanned ground vehicle (UGV) landing and recharge maneuvers; utilize high-fidelity physics and aerodynamics simulation environment to support autonomy and teaming development. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	4.093	4.249	4.387

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*				Project (Number/Name) CN1 / *Disruptive Countermeasure Concepts for Aviation*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
CN1: *Disruptive Countermeasure Concepts for Aviation*	-	7.342	7.546	7.668	-	7.668	7.245	7.249	7.328	7.401	0.000	51.779

A. Mission Description and Budget Item Justification

This Project investigates advanced technologies to reduce Future Vertical Lift (FVL) platform susceptibility and vulnerability to damage from guided and unguided threats, as well as technologies to defeat small arms, rocket, and missile threats. This Project performs research and develops innovative detect and defeat technologies against next -generation threats to the FVL. Areas of research include new laser materials and designs for in-band, low size, weight, power, and cost (SWaP-C) precision laser soft-kill countermeasures operating in the mid- and long-wave infrared, lethality effects of ultrashort pulsed lasers, and sensitive radio frequency (SeRF) detection modality for use as aircraft survivability equipment (ASE). In addition, this Project will also perform research and development on the use of remotely-deployed, passive multi-modal sensors to localize threat ground vehicles and discriminate decoys.

Research in this Project is fully coordinated with Program Element (PE) 0602146A (Network C3I Technology) / Project AN7 (COE - Every Receiver is a Sensor Technology), PE 0602148A (Future Vertical Lift Technology) / Project CH3 (Holistic Team Survivability Technology), PE 0603463A (Network C3I Advanced Technology) / Project AN8 (COE - Every Receiver is a Sensor Advanced Tech), and PE 0603465A (Future Vertical Lift Advanced Technology) / Project AL1 (Adv Teaming for Tactical Aviation Oper Adv Tech).

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.

Work in this Project is performed by Army Research Laboratory (ARL).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Cognitive Countermeasures Technology Development	2.064	2.095	2.109
Description: This effort investigates and matures novel materials, components, and techniques to counter legacy and emerging threats to FVL platforms. Emphasis will be placed on technologies and approaches to enable a robust, holistic countermeasure capability for target defeat, regardless of threat characteristics or guidance mode. ***FY 2024 Plans:*** Will investigate optimal approaches to multi-band sensitive radio frequency (SeRF) novel detection modalities and integrate multi-band components for system assessments. Will investigate the feasibility of realizing state-of-the-art Microelectromechanical (MEMS) Radio Frequency (RF) power and phase detection for augmented range and signals intelligence capabilities of related SeRF systems. Will design and develop optimized pulsed laser sources based on selected best Midwave Infrared (MWIR)			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CN1 / *Disruptive Countermeasure Concepts for Aviation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
approach. Will mature Q-switching and cooling design components. Will conduct experiments to identify best pathways toward pulsed Longwave Infrared (LWIR) sources. Will improve experimental techniques in LWIR region using Ultra-Short Pulse Lasers (USPL) to further study optical and non-optical RF effects. ***FY 2025 Plans:*** Will design and develop tandem-pumped, high energy pulsed mid-wave infrared (MWIR) laser sources optimized for pulse-burst regime to further minimize laser system SWAP; design and develop direct-diode-pumped, ultra-low SWAP, MWIR laser sources optimized for pulse-burst regime with advanced phase-change cooling; mature wavelength conversion materials and techniques for longwave infrared (LWIR) sources; validate ultra-short pulse lasers (USPL) non-optical effects measurements, such as radio frequency (RF) generation and damage at multiple wavelengths; advance highly sensitive RF detection components conforming to an ultra-low SWaP-C architecture through the incorporation of thin film materials. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Title: Deep Autonomous Sensing ***Description:*** This effort investigates the ability to localize and recognize the formation of threat ground vehicles deep in the battlefield in support of the FVL platform. Emphasis will be placed on developing novel, passive multi-modal sensors on aerial, ground, and re-locatable platforms to enable high fidelity, low false alarm target recognition and counter concealment and camouflage with decoy discrimination. ***FY 2024 Plans:*** Will conduct experiments to validate approaches to teaming between multi-modal ground-based sensor constellations with FVL airborne platforms (manned and/or unmanned) by integrating prototype sensor constellations with Army aviation prototype and surrogate platforms. Will investigate and conduct experiments with air-deployed sensor concepts and methodologies to ensure low-cost mechanical designs. Will investigate and experiment with implementations of cost effective Position, Navigation, and Timing (PNT) techniques in the ground constellation of fixed and relocatable sensors in support of position and attitude determination for cost effective geolocation of threats. Will enhance methods of multi-modal sensor fusion, classification, and tracking of threat vehicles insensitive to obscurant, camouflage, and jamming. ***FY 2025 Plans:*** Will develop novel, multi-modal sensor fusion algorithms to detect, locate, and track formations of mechanized vehicles; advance cross modal sensing algorithms to enhance classification confidence and detect anomalies; research and investigate efficient methods to discriminate real targets using passive, non-imaging sensors networked together to extend range and reject clutter; assess autonomy in teaming between unmanned ground sensors and unmanned ground and aerial vehicles in collaboration with	5.278	5.451	5.559

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CN1 / *Disruptive Countermeasure Concepts for Aviation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Aviation and Missile Center (AvMC); validate the implementation of algorithms on low-size, weight, power, and cost (SWAP-C) sensor platforms for targeting threat vehicles. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	7.342	7.546	7.668

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) CU7 / *Control & Autonomy for Tactical Superiority Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CU7: *Control & Autonomy for Tactical Superiority Tech*	-	4.321	4.796	5.783	-	5.783	8.404	10.467	9.985	10.858	0.000	54.614

A. Mission Description and Budget Item Justification

This Project will develop and flight-validate new approaches and tools applicable to advanced high-speed configurations being considered for Future Vertical Lift (FVL) and transition to industry to ensure that FVL aircraft meet Army requirements. Work in this Project may also address and be applied to the needs of other Army and specific Department of Defense (DoD) aviation systems.

Research in this Project is fully coordinated with Program Element (PE) 0603043A (Air Platform Advanced Technology), Project CV1 (Control & Autonomy for Tactical Superiority Adv).

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

Work in this Project is performed by Aviation & Missile Center (AvMC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Adaptive Tactical Autonomy and Control (ATAC) Tech	4.321	4.796	5.422
Description: Develop 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.			
FY 2024 Plans: Will develop flight control concepts that intelligently adjust aircraft response characteristics based on configuration, mission, and pilot input. Will mature concepts for transition of control between pilot and autonomous system and back to normalize pilots' utilization of autonomous functions. Will develop an architecture for the interface between autonomy algorithms and flight controls for over-actuated FVL-relevant configurations that enable control re-allocation schemes developed to enhance survivability and damage tolerance to be extended to autonomous flight.			
FY 2025 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CU7 / *Control & Autonomy for Tactical Superiority Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Will update AvMCs high-fidelity flight-dynamics modeling tool to run in real time with selectable levels of fidelity. Will develop methods for using estimation to compensate for failed sensors to enable graceful degradation. Will continue developing handling qualities requirements for high-speed flight. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase in FY25 supports software and simulation activities associated with advanced flight controls and autonomy efforts.			
Title: Perception Enhanced Autonomous Control (PEAC) ***Description:*** Develop autonomous systems that maintain real time representation of flight environment and use AI- and ML-based perception to "understand" the environment, detect and identify threats, and take action based on aircraft state to enhance survivability. ***FY 2025 Plans:*** Will conduct research into sensor range, field of view, and performance needed for high-speed flight. Will start evaluating non-emitting sensors for position determination and autonomous navigation. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** This effort begins in FY25 with funding realigned from PE 0603465A (Future Vertical Lift Advanced Technology), Project AL1 (Adv Teaming for Tactical Aviation Oper Adv Tech).	-	-	0.361
Accomplishments/Planned Programs Subtotals	4.321	4.796	5.783

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*				Project (Number/Name) CU8 / *Structures Tech for Enduring Efficient Resilience*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
CU8: *Structures Tech for Enduring Efficient Resilience*	-	1.588	1.682	1.048	-	1.048	1.050	1.050	1.061	1.072	0.000	8.551

A. Mission Description and Budget Item Justification

This Project will ensure critical structures technologies providing improved weight efficiency, fatigue tolerance, parasitic weight avoidance, and integration / synergy opportunities will transition to Advanced Technology Development tasks to later provide Future Vertical Lift (FVL) Project Management Offices and Original Equipment Manufacturers mission performance benefit in terms of range/payload, survivability, sustainment, and operational availability. Research in this Project may also address and be applied to the needs of other Army and specific DoD aviation systems.

Research in this Project is fully coordinated with Program Element (PE) 0603043A (Air Platform Advanced Technology), Project CV2 (Structures Platform Int Resilience & Efficiency).

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

Work in this Project is performed by Aviation & Missile Center (AvMC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Multifunctional Advanced Structural Concepts (MASC)	1.588	1.682	1.048
Description: Develop innovative, critical, highly weight-optimized, durable, fatigue-resistant, damage-tolerant structural concepts exploiting multifunctionality for weight savings and broad multi-scale FVL benefit impact.			
FY 2024 Plans: Will apply advanced composite material forms and titanium additive manufacturing to develop innovative concepts enhancing structural weight efficiency applicable to FVL across size classes. Will develop enhanced analysis of structural composites. Will continue to apply integration methodology in guiding development of technologies to optimize benefits of reduced weight, increased resilience, and reduced maintenance.			
FY 2025 Plans: Will develop optimized structural concepts with innovative internal stiffening and health monitoring for UAS and other platform applications. Will develop innovative composite structure manufacturing technologies and FVL-relevant fabricate proof-of-concept component.			
FY 2024 to FY 2025 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CU8 / *Structures Tech for Enduring Efficient Resilience*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Funding decrease in FY25 corresponds to decrease in breadth of structural concepts developed.			
Accomplishments/Planned Programs Subtotals	1.588	1.682	1.048

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) CU9 / *Systems Design Technology*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CU9: *Systems Design Technology*	-	2.996	3.135	4.435	-	4.435	5.237	5.345	5.405	5.459	0.000	32.012

Note

In Fiscal Year (FY) 2025 a portion of this Project was restructured from Program Element (PE) 0602148A (Future Verticle Lift Technology), Project CH2 (Air Launched Effects Technology).

A. Mission Description and Budget Item Justification

This Project will leverage large datasets and advances in multi-disciplinary optimization techniques, incorporate higher fidelity analysis, and machine learning techniques to improve predictions of emerging aviation requirements and system complexity.

Research in this Project is fully coordinated with Program Element (PE) 0603043A (Air Platform Advanced Technology).

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

Work in this Project is performed by Aviation & Missile Center (AvMC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Concept Design and Optimization Methods	2.996	3.135	4.435
Description: Expand scope of design and assessment support across Future Vertical Lift (FVL) lines of effort (LOEs) and the science and technology portfolio. Incorporate method enhancements to improve timeliness, accuracy, and detail of conceptual design (performance, weight, and cost).			
FY 2024 Plans: Will further develop tools and methods to improve rotorcraft design and optimization with advanced component models and improved modeling framework. Will apply tools to trade studies to explore aircraft concepts for Future Vertical Lift (FVL) as well as electric and hybrid rotorcraft concepts.			
FY 2025 Plans: Will further develop tools and methods for rotorcraft design and optimization methods. Will continue to develop advanced component and cost models for rotary wing and fixed wing aircraft. Will apply tool sets to future air vehicle trade studies to support			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CU9 / *Systems Design Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Future Vertical Lift (FVL), electric Vertical Take Off and Landing (eVTOL) and hybrid-electric concepts and will explore concepts for contested logistics. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** FY25 funding increase supports application of design and optimization methods to multiple lines of effort including Future Vertical Lift (FVL), eVTOL, hybrid-electric, and Contested Logistics air vehicle concepts. In Fiscal Year (FY) 2025 a portion of this effort was restructured from Program Element (PE) 0602148A (Future Verticle Lift Technology), Project CH2 (Air Launched Effects Technology).			
Accomplishments/Planned Programs Subtotals	2.996	3.135	4.435

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) CW3 / *Advanced Rotors Applied Technology*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CW3: *Advanced Rotors Applied Technology*	-	2.495	2.614	2.015	-	2.015	2.017	2.650	2.678	2.705	0.000	17.174

A. Mission Description and Budget Item Justification

This Project investigates Future Vertical Lift (FVL) and other Army and Department of Defense (DoD) aviation systems technologies that mature high speed and highly efficient rotor and hub system designs.

Research in this Project is fully coordinated with PE 0603043A (Air Platform Advanced Technology) / Project CX1 (Advanced Rotors Advanced Tech).

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

Work in this Project is performed by Aviation & Missile Center (AvMC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Advanced Hubs Tech ***Description:*** Investigate advanced rotor system and hub technologies to support goals of increased speed and lift by developing configurations and technologies that reduce drag and enable more efficient rotor system performance. ***FY 2024 Plans:*** Will refine advanced rotor hub conceptual designs. Will conduct detailed analysis on hub to determine performance benefits. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects planned conclusion of this effort and transition to PE 0603043A (Air Platform Advanced Technology), Project CX1 (Advanced Rotors Advanced Tech). Funding realigned to Innovative Rotor Blade Manufacturing Processes within this project.	2.495	2.614	-
Title: Innovative Rotor Blade Manufacturing Processes ***Description:*** Develop more automated processes such as automated fiber placement, additive manufacturing, lower cost and fabrication time. ***FY 2025 Plans:*** Will conduct initial rotor blade manufacturing technology screening and down select. Start component test planning. ***FY 2024 to FY 2025 Increase/Decrease Statement:***	-	-	2.015

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CW3 / *Advanced Rotors Applied Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
This effort begins in FY25 with funding realigned from Advanced Hubs Tech within this project.			
Accomplishments/Planned Programs Subtotals	2.495	2.614	2.015

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) CW4 / *Air Vehicle Structures and Dynamics Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CW4: *Air Vehicle Structures and Dynamics Tech*	-	2.876	3.042	3.078	-	3.078	3.083	3.085	3.119	3.150	0.000	21.433

A. Mission Description and Budget Item Justification

This Project develops modeling tools and methodologies needed to research low noise and aero elastically stable rotor technologies. Research in this Project enables high speed flight, longer flight envelopes, and lower noise signatures in Future Vertical Lift (FVL) platforms and is also applicable to the family of FVL manned and unmanned platforms.

Research in this Project is fully coordinated with Program Element (PE) 0603465A (Future Vertical Lift Advanced Technology Development).

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 Army Research Laboratory (ARL).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Air Vehicle Structures and Dynamics Technologies	2.876	3.042	3.078
Description: Establish improved experimentally validated modeling tools and methodologies that can be used to understand the physics of aeroelastic stability and design in next generation rotorcraft platform configurations for FVL platforms. This involves the development of an experimental capability, the Tiltrotor Aeroelastic Stability Test (TRAST), which will be used to generate novel experimental data. This data will be used to increase fundamental understanding of the whirl flutter instability, which currently limits the high speed performance of tiltrotor rotorcraft. This effort will inform FVL requirement definition and technology maturation. This effort also establishes low noise rotor concepts and investigates the intersection of artificial intelligence and classical mechanics to enable novel mechanics and new approaches in structural dynamics for FVL applications to enable higher Operating Tempo (OPTEMPO) operations.			
FY 2024 Plans: Will conduct Tiltrotor Aeroelastic Stability Test (TRAST) in NASA's Langley Transonic Dynamics Tunnel (TDT) to explore effects of the rotor and control system parameters on tiltrotor aircraft whirl flutter boundaries. Will explore experimentally and analytically, the active control technology-Generalized Predictive Control (GPC) on tiltrotor stability augmentation. Will explore analytically, winglet and wing extension for tiltrotor aircraft performance and stability improvement. Will investigate aeroelastic stability and vibratory loads of lift-offset coaxial rotor at high flight speed. Will develop a tool chain to analyze the boundary layer noise from			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CW4 / *Air Vehicle Structures and Dynamics Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
rotor airfoils, including multi element airfoils and use the tools to find low noise rotor blade designs; assess the low noise designs experimentally. Will develop crashworthy navigation and flight controls algorithms to adapt to congested environments. ***FY 2025 Plans:*** Will investigate aeroelastic stability and vibratory loads of a hinge less tiltrotor utilizing the Tiltrotor Aeroelastic Stability Test (TRAST) wind tunnel capability; investigate the effectiveness of the Generalized Predictive Control (GPC) on the control and reduction of the hinge less tiltrotor's vibratory loads; conduct TRAST wind tunnel assessments in the Transonic Dynamics Tunnel (TDT) to explore the effects of wing extension on tiltrotor performance and aeroelastic stability; document the design of the lift-offset coaxial rotor aeroelastic stability assessment bed; develop a machine learning model to provide fast and accurate airfoil/ rotor aerodynamic loads for a wide range of airfoil/rotor configurations; investigate novel rotor concepts with the potential for quiet operation and improve accuracy and range of acoustic modeling capabilities; enable Air Launch Effects and other platforms to reject atmospheric disturbances as well as navigate within the wake of air or ground platforms for launch and recovery. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	2.876	3.042	3.078

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) CW5 / *Experimental and Computational Aeromechanics Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CW5: *Experimental and Computational Aeromechanics Tech*	-	6.359	6.835	6.918	-	6.918	6.927	6.930	7.007	7.077	0.000	48.053

A. Mission Description and Budget Item Justification

This Project investigates new high fidelity computational methods to simulate aerodynamic effects and test methods of emerging rotorcraft lift technologies that could be incorporated into Future Vertical Lift (FVL) designs and other Army and Department of Defense (DoD) aviation systems.

Research in this Project is fully coordinated with PE 0603043A (Air Platform Advanced Technology).

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

Work in this Project is performed by Aviation & Missile Center (AvMC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Experimental Aeromechanics	4.044	4.366	4.463
Description: Develop and explore new methods to simulate aerodynamic effects for aircraft and other future FVL configurations. ***FY 2024 Plans:*** Will develop a powered tail rotor test stand for more accurate physical modeling of winged compound rotorcraft interactional aeromechanics to provide fundamental understanding and validation data for computational tools. Will investigate advanced high speed compound rotorcraft wing designs to provide improved hover and forward flight performance. Will investigate state of the art measurement & data analysis techniques for rotorcraft to provide new or improved data sets for computational tool validation. Will conduct tests to investigate methods of rotorcraft hub drag reduction on FVL relevant configurations. ***FY 2025 Plans:*** Will mature advanced high speed compound rotorcraft wing designs to provide improved hover and forward flight performance; conduct tests to investigate methods of rotorcraft hub drag reduction; investigate state of the art measurement & data analysis techniques for rotorcraft to provide new or improved data sets for computational tool validation; investigate passive and active methods for rotor performance improvements. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Title: Computational Aeromechanics	2.315	2.469	2.455

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CW5 / *Experimental and Computational Aeromechanics Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Description: Verify, validate and apply high-fidelity modeling and simulation software tools for rotorcraft aeromechanics. ***FY 2024 Plans:*** Will verify and validate reduced-order and surrogate computational aeromechanics models for Future Vertical Lift (FVL) aircraft that provide high accuracy while running fast enough for use in rotorcraft design applications. Will demonstrate and test these new design-oriented computational models by addressing engineering problems for relevant FVL aircraft configurations. ***FY 2025 Plans:*** Will test and validate the higher-order computational models for FVL and FTUAS configurations for improved accuracy. Will perform validation of permeable-surface formulation for acoustics predictions for FVL configurations. Will conduct a performance evaluation of the GPU version of rotorcraft computational model for Future Vertical Lift (FVL) configurations. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding decrease reflects planned lifecycle of this effort.			
Accomplishments/Planned Programs Subtotals	6.359	6.835	6.918

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) CW6 / *Future UAS Propulsion Technology*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CW6: *Future UAS Propulsion Technology*	-	3.289	3.560	3.602	-	3.602	3.605	3.608	3.647	3.683	0.000	24.994

A. Mission Description and Budget Item Justification

This Project designs and assesses advanced engine and power system component technologies to support the goals of multi-fuel capability, reduced fuel consumption, and reduced engine size, weight, and cost in current and Future Unmanned Aircraft Systems (FUAS).

Research in this Project is fully coordinated with PE 0602148A (Future Vertical Lift Technology), Project CH4 (Power & Thermal Management for FVL Tech).

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.

Work in this Project is performed by Army Research Laboratory (ARL).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Multi-Fuel Capable Hybrid Electric Propulsion	3.289	3.560	3.602
Description: Applied research to enable intelligent and robust propulsion performance and noise signature reduction via multi-fuel and optimized hybrid electric capability for small engines (20kW to 150kW) powering future aircraft systems. The research focuses on the establishment of concepts to enable reduced fuel consumption, engine size, weight, and cost as well as improved group three and four FUAS reliability, survivability, and maintainability.			
FY 2024 Plans: Will integrate combustion and fuel property sensing, explore control strategy for varied ignition quality fuels to enable multi-fuel capability, and assess novel ignition assistant in relevant engine environment. Will validate oil-free bearing analysis tool and turbocharger aeroelasticity tool. Will extend validation of motor design tools to higher rotational speeds. Will validate and verify system level hybrid-electric architectures. Will continue augmenting hybrid-electric optimization and integration tool capabilities by introducing new higher fidelity models.			
FY 2025 Plans: Will assess improved ignition assistant with oxidation resistant coating; implement real time combustion sensing and machine learning based methods to improve engine control algorithms; assess and validate system level simulation results from the Gas Lubricated Interactive Design Environment tool; assess combined radial bearing-less motor and axial gas bearing for hybrid			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CW6 / *Future UAS Propulsion Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
electric applications; implement super-critical carbon dioxide thermal management module and validate optimized hybrid-electric optimization and integration tool (HEART) outputs. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	3.289	3.560	3.602

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*				Project (Number/Name) CW7 / *High Speed and Efficient VTOL Vehicle Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
CW7: *High Speed and Efficient VTOL Vehicle Tech*	-	1.492	1.580	1.583	-	1.583	1.585	1.587	1.604	1.620	0.000	11.051

A. Mission Description and Budget Item Justification

This Project designs and develops material component technologies and dynamic models to enable future generation capabilities for Future Vertical Lift (FVL) platforms. This Project is focused on improving range, payload, and endurance performance as well as reliability and maintainability metrics. The outcomes from the efforts within this Project will be applicable to the Family of Future Vertical Lift manned and unmanned platforms.

Research in this Project is fully coordinated with PE 0602183A (Air Platform Applied Research), Project CW8 (Next Generation Aviation Transmission Apl Tech).

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.

Work in this Project is performed by Army Research Laboratory (ARL).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: High Speed Efficient Vertical Take-Off and Landing (VTOL)Vehicle Technologies	1.492	1.580	1.583
Description: This effort establishes propulsion concepts for vertical take-off and landing to enable improved, efficient hover and high-speed cruise at longer range without added weight.			
FY 2024 Plans: Will continue to develop experimental techniques to assess hybrid gear failure modes. Will continue to develop a dynamic model of a transmission topology that is non-conventional for rotorcraft. Will prepare the Vehicle Innovative Powertrain Experimental Research (VIPER) facility to perform hybrid-electric propulsion transmission experiments. Will assess tribolological performance of functionally-graded ceramic/metal materials at the coupon level. Will expand the machine learning (ML) toolbox for investigating failure modes of electric rotating machinery.			
FY 2025 Plans: Will compare and validate data-driven condition indicators from simulated data with experimental rig and field system data; expand fault models to second fault type/location for training artificial intelligence towards a fully computational implementation; conduct parametric study to exercise models of conventional and non-conventional transmissions to determine fault sensitivity and detection method optimization (damage location, sensor types, and sensor location).			
FY 2024 to FY 2025 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CW7 / *High Speed and Efficient VTOL Vehicle Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	1.492	1.580	1.583

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) CW8 / *Next Generation Aviation Transmission Apl Tech*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CW8: *Next Generation Aviation Transmission Apl Tech*	-	1.428	1.511	-	-	-	-	-	-	-	0.000	2.939

Note

In FY25 this Project is restructured to Program Element (PE) 0602183A (Air Platform Applied Research), Project DK1 (Air Vehicle Integrated & Alternative Tech (AVIATe)).

A. Mission Description and Budget Item Justification

This Project investigates Future Vertical Lift (FVL) and other Army and Department of Defense (DoD) advanced drive train technologies that increase performance and double current drivetrain life cycles while improving their reliability and maintainability.

Research in this Project is fully coordinated with PE 0603043A (Air Platform Advanced Technology).

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

Work in this Project is performed by Aviation & Missile Center (AvMC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: High Reduction Ratio Transmission (HRT) Components	1.428	1.511	-
Description: Effort investigates advanced materials and component designs that allow a 60:1 reduction ratio two-stage gearbox design that provides significant weight and volume reduction for extended range and component life for manned and unmanned applications. ***FY 2024 Plans:*** Will perform tribology testing and analysis of advanced gear/bearing materials using in-house testing facilities. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** In FY25 this effort is restructured to Program Element (PE) 0602183A (Air Platform Applied Research), Project DK1 (Air Vehicle Integrated & Alternative Tech (AVIATe)).			
Accomplishments/Planned Programs Subtotals	1.428	1.511	-

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** CW8 / *Next Generation Aviation Transmission Apl Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army											Date: March 2024	
Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*				Project (Number/Name) DC2 / *High Performance Computing for Rotorcraft Apl Tech*			
COST ($ in Millions)	**Prior Years**	**FY 2023**	**FY 2024**	**FY 2025 Base**	**FY 2025 OCO**	**FY 2025 Total**	**FY 2026**	**FY 2027**	**FY 2028**	**FY 2029**	**Cost To Complete**	**Total Cost**
DC2: *High Performance Computing for Rotorcraft Apl Tech*	-	1.221	1.293	1.309	-	1.309	1.311	1.312	1.326	1.339	0.000	9.111

A. Mission Description and Budget Item Justification

This Project investigates and validates aeromechanics modeling and simulation tools for Future Vertical Lift (FVL) and other Army and DoD aviation systems and platforms. Research efforts in this Project are also applicable to the family of FVL manned and unmanned platforms.

Research in this Project is fully coordinated with PE 0603043A (Air Platform Advanced Technology), Project DC3 (HPC for Army Aviation Concepts).

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

Work in this Project is performed by Aviation & Missile Center (AvMC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: High Performance Computing for Aviation Applications	1.221	1.293	1.309
Description: Develop automated, high-fidelity computational tools for rotorcraft analysis and design. ***FY 2024 Plans:*** Will develop and demonstrate new high-fidelity aeromechanics modeling and simulation tools to address relevant rotorcraft design problems for FVL-relevant aircraft. Will ensure that these new aeromechanics modeling and simulation tools run efficiently and effectively on state-of-the-art new heterogeneous high-performance computing systems. ***FY 2025 Plans:*** Will develop and validate a GPU performance portable version of rotorcraft computational model to reduce the simulation time for FVL configurations from weeks to days. Will ensure that the new models run efficiently on the new state-of-the-art high-performance computing systems. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase is an economic adjustment.			
Accomplishments/Planned Programs Subtotals	1.221	1.293	1.309

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** DC2 / *High Performance Computing for Rotorcraft Apl Tech*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) DE2 / *Airborne Threat Defeat*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
DE2: *Airborne Threat Defeat*	-	-	5.794	7.423	-	7.423	6.505	-	-	-	0.000	19.722

A. Mission Description and Budget Item Justification

Airborne Threat Defeat addresses the need to engage and disorient guided threats.

Work in this Project complements Program Element (PE) 0603465A (Future Vertical Lift Advanced Technology) / Project CA8 (Adv Rotocraft Armaments Protection Sys).

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

Work in this Project is performed by the Armaments Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Airborne Threat Defeat Tech	-	5.794	7.423
Description: This effort develops novel weapon, munition and fire control system technology required to increase standoff distance and engagement time to decoy or defeat guided threats. ***FY 2024 Plans:*** Will investigate concepts to decoy and defeat advanced, agile, and guided aerial threats with novel weapon, munition, and fire control system technologies. Will develop modeling and simulation tools to evaluate potential decoy and defeat techniques. Will investigate miniaturized electro-chemical-mechanical payloads for advanced threat decoy or threat. ***FY 2025 Plans:*** Will investigate combined electro-chemical-mechanical payloads and targeting concepts for decoy and defeat of current and emerging aerial threats; design and develop armament components and systems to decoy and defeat aerial threats through algorithms and conceptualization techniques. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** Funding increase reflects the planned investigation of electro-chemical-mechanical payloads and targeting concepts for the decoy and defeat of aerial threats.			
Accomplishments/Planned Programs Subtotals	-	5.794	7.423

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** DE2 / *Airborne Threat Defeat*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army			Date: March 2024
Appropriation/Budget Activity 2040 / 2	R-1 Program Element (Number/Name) PE 0602183A / *Air Platform Applied Research*	Project (Number/Name) DK1 / *Air Vehicle Integrated & Alternative Tech (AVIATe)*	

COST ($ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
DK1: *Air Vehicle Integrated & Alternative Tech (AVIATe)*	-	-	-	2.998	-	2.998	6.423	8.249	8.536	7.109	0.000	33.315

Note

Air Vehicle Integrated & Alternative Tech (AVIATe) is a new start within the Air Platform Applied Research program in FY 2025.

A. Mission Description and Budget Item Justification

This project enhances Army aviation mission capability and addresses operational energy and environmental challenges. Includes the development, maturation, and system design of technologies including advanced engines, hybrid and electric systems, power and control allocation, propulsive power delivery, electric actuation, structures, and other technologies that enhance performance, efficiency or are critical to implementation.

Work in this Project is fully coordinated with PE 0603043A (Air Platform Advanced Technology) / Project DK2 (Air Vehicle Improvements & Advanced Tech (AVIATe)).

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

Work in this Project is performed by the Aviation & Missile Center (AvMC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Title: Hybrid-Electric Aviation Technology (HEAT)	-	-	1.796
Description: This effort focuses on building a knowledge base within Army aviation to assess the viability of meeting future rotorcraft motive and mission equipment power needs through design, architecture, system alternatives and technology trade studies, investigating and developing hybrid-electric component and sub-system technologies. Emphasis is on knowledge building, analytical tools, performance improvement, and to address Army unique technology gaps. ***FY 2025 Plans:*** Will perform system architecture and hybrid electric technology trade studies to address Army aviation unique gaps. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** In FY25, this effort is a new start.			
Title: Supplemental Power Efficient Engines and Drives (SPEED)	-	-	1.202

Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 2	**R-1 Program Element (Number/Name)** PE 0602183A / *Air Platform Applied Research*	**Project (Number/Name)** DK1 / *Air Vehicle Integrated & Alternative Tech (AVIATe)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2023	FY 2024	FY 2025
Description: This effort develops supplemental power, engine, and drives systems component technologies to improve power-to-weight ratio, efficiency, and provide improved mission capability for Army aircraft systems. Technology will be validated through component level test. ***FY 2025 Plans:*** Will perform design of propulsion and power component technology to consist of advanced supplementary power, engines, and/or drive system technology for application to Future Vertical Lift aircraft. ***FY 2024 to FY 2025 Increase/Decrease Statement:*** In FY25, this effort is a new start.			
Accomplishments/Planned Programs Subtotals	-	-	2.998

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A