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**Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Air Force** **Date:** March 2024

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 2: Applied Research</i>	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>
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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	-	188.407	161.268	5.235	0.000	5.235	4.958	5.061	5.219	5.328	Continuing	Continuing
622401: <i>Structures</i>	-	75.538	67.567	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
622403: <i>Flight Controls and Pilot-Vehicle Interface</i>	-	37.350	39.916	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
622404: <i>Aeromechanics</i>	-	9.233	10.135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
622405: <i>High Speed Systems Technology</i>	-	62.938	40.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
625172: <i>NUCLEAR SYSTEM TECHNOLOGY</i>	-	3.348	3.624	5.235	0.000	5.235	4.958	5.061	5.219	5.328	Continuing	Continuing

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

This program investigates, develops, and analyzes aerospace vehicle technologies in the primary areas of high speed systems, autonomy and flight control technologies, aeromechanics, structure systems and nuclear system technology. The effort has five current projects, each focusing on a technology area critical to the Department of the Air Force. The High Speed Systems Technology project develops component level vehicle technologies for expendable and reusable high speed/hypersonic aerospace systems. The Flight Controls and Pilot-Vehicle Interface project develops technologies that enable affordable mass and maximum capabilities for manned, remotely-piloted and autonomous aerospace vehicles. The Aeromechanics and Integration project designs advanced aerodynamic vehicle configurations that are developed and analyzed through simulations, experiments, and multi-disciplinary analyses. It also develops design techniques, incorporating vehicle, inter-vehicle, and intra-vehicle control systems. The Structures project develops and exploits new materials, and fabrication processes. The Nuclear System Technology project provides science and technology to preserve nuclear deterrence for future generations.

In FY 2025, the RDT&E Budget Activity 02 (BA02) Aerospace Vehicles Technologies efforts and activities under PE 0602201F, are transferred to PE 0602203F, Aerospace Propulsion for increased integration between airframe, flight control, propulsion, electrical, power and thermal management.

In FY 2025, the entirety of PE 0602201F, Aerospace Vehicle Technologies, Project 622401 Structures, is transferred to PE 0602203F, Aerospace Propulsion, Project 622401 Structures.

In FY 2025, the entirety of PE 0602201F, Aerospace Vehicle Technologies, Project 622403, Flight Controls and Pilot-Vehicle Interface, will be transferred to PE 0602203F, Aerospace Propulsion, Project 622403 Flight Controls and Pilot-Vehicle Interface.

In FY 2025, the entirety of PE 0602201F, Aerospace Vehicle Technologies, Project 622404, Aeromechanics, is transferred to PE 0602203F, Aerospace Propulsion, Project 622401 Structures.

**UNCLASSIFIED**

**Exhibit R-2, RDT&E Budget Item Justification:** PB 2025 Air Force **Date:** March 2024

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 2: Applied Research</i>	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>
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In FY 2025, the entirety of PE 0602201F, Aerospace Vehicle Technologies, Project 622405, High Speed Systems Technology, is transferred to PE 0602203F, Aerospace Propulsion, Project 622405 High Speed Systems Technology.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. The use of program funds in this program element would be in addition to the civilian pay expenses budgeted in program elements 0601102F, 0602020F, 0602102F, 0602203F, 0602202F, 0602204F, 0602602F, 0602605F, 0602788F, 0602298F, and 1206601SF.

This program element may include necessary expenses to support the operation and maintenance of facilities to manage, execute, and deliver science and technology capabilities.

This program is in Budget Activity 2, Applied Research because this budget activity includes studies, investigations, and non-system specific technology efforts directed toward general military needs with a view toward developing and evaluating the feasibility and practicality of proposed solutions and determining their parameters.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>
Previous President's Budget	199.453	161.268	157.425	0.000	157.425
Current President's Budget	188.407	161.268	5.235	0.000	5.235
Total Adjustments	-11.046	0.000	-152.190	0.000	-152.190
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.869	0.000			
• SBIR/STTR Transfer	-3.799	0.000			
• Other Adjustments	-6.378	0.000	-152.190	0.000	-152.190

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 622401: *Structures*

Congressional Add: *Full scale determinant assembly for hypersonic airframe structures*

Congressional Add Subtotals for Project: 622401

**Project:** 622405: *High Speed Systems Technology*

Congressional Add: *Program increase - educational agreement partnership for aerospace engineering security integration*

Congressional Add: *Program increase: educational partnership agreement for secure UAV technologies*

	<b>FY 2023</b>	<b>FY 2024</b>
	9.809	-
	9.809	-
	9.809	-
	9.809	-

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2025 Air Force	<b>Date:</b> March 2024
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 2: Applied Research</i>	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

Congressional Add: *Program increase: collaborative hypersonic demonstration*

Congressional Add Subtotals for Project: 622405

Congressional Add Totals for all Projects

	FY 2023	FY 2024
	9.809	-
	29.427	-
	39.236	-

**Change Summary Explanation**

FY 2025 funding decreased compared to FY 2024 by \$152.190 million. The decrease is due to the transfer of Aerospace Vehicle Technology efforts to PE 602203F, Aerospace Propulsion.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 3600 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>				<b>Project (Number/Name)</b> 622401 / <i>Structures</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
622401: <i>Structures</i>	-	75.538	67.567	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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

This project develops advanced structures concepts to exploit new materials and fabrication processes and investigates new concepts and design techniques. New structural concepts include low cost design and fabrication techniques, incorporating subsystem hardware items and adaptive mechanisms into the aerospace structures and/or skin of the platform.

In FY 2025, the entirety of PE 0602201F, Aerospace Vehicle Technologies, Project 622401 Structures, is transferred to PE 0602203F, Aerospace Propulsion, Project 622401 Structures for increased integration between airframe, flight control, propulsion, electrical, power and thermal management.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p><b>Title:</b> Aircraft Service Life Technologies</p> <p><b>Description:</b> Develop an economic service life analysis capability comprised of analysis tools, methodologies, and structural health monitoring technologies.</p> <p><b>FY 2024 Plans:</b> Not Applicable</p> <p><b>FY 2025 Plans:</b> Not Applicable</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> Not Applicable</p>	1.996	0.000	0.000
<p><b>Title:</b> Vehicle Design Technologies</p> <p><b>Description:</b> Develop methodologies to reduce the cost and time involved from design to full-scale testing of structural concepts and aerospace systems.</p> <p><b>FY 2024 Plans:</b> Continue the development of advanced high fidelity aircraft design tools. Continue the development of new design methods that link vehicle system requirements to mission operation performance. Continue the integration of model-based system engineering methodology with risk-aware aircraft design methods. Initiate the integration of cost, mission effectiveness and affordable manufacturing methods with uncertainty quantification across all performance variables to include risk.</p> <p><b>FY 2025 Plans:</b></p>	17.090	18.137	0.000

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622401 / <i>Structures</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>- Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622401, Structures, Vehicle Design Technologies effort.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> FY 2025 decreased compared to FY 2024 by \$18.137 million. Funding decreased due to transfer of Vehicle Design Technologies effort to PE 0602203F, Aerospace Propulsion, Project 622401 Structures, Vehicle Design Technologies effort.</p>				
<p><b>Title:</b> Structural Concepts</p> <p><b>Description:</b> Develop design methods, processes, and lightweight, adaptive, and multifunctional structural concepts to capitalize on new materials, multi-role considerations, and technology integration into aircraft systems.</p> <p><b>FY 2024 Plans:</b> Complete development of innovative structural design methods to dramatically reduce weight and complexity of aircraft structures. Complete the validation of impact damage analysis and methods for advanced fail-safe composite structures applicable to next generation aircraft. Continue new low cost design and manufacturing structural concepts for attritable vehicles. Continue development of low-cost agile manufacturing concepts for structures in support of the development of a next variant of a low cost unmanned aerospace system. Initiate systems engineering assessments for the development of airworthiness certification criteria for advanced airframe structures. Initiate the validation of innovative structural design methods to dramatically reduce weight and complexity of aircraft structures. Initiate the demonstration of the fatigue life of bonded unitized composite structures for the next generation of aircraft</p> <p><b>FY 2025 Plans:</b> - Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622401, Structures, Structural Concepts effort.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> - FY 2025 decreased compared to FY 2024 by \$24.938 million. Funding decreased due to transfer of Structural Concepts effort to PE 0602203F, Aerospace Propulsion, Project 622401 Structures, Structural Concepts effort.</p>		22.780	24.938	0.000
<p><b>Title:</b> Next Generation Aerodynamic Technologies</p> <p><b>Description:</b> Develop and assess technologies for the next generation of multi-role large aircraft.</p> <p><b>FY 2024 Plans:</b></p>		7.837	7.318	0.000

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622401 / <i>Structures</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p>Continue the development of advanced high fidelity aerodynamic analysis tools for aircraft conceptual design. Continue assessment of innovative next generation vehicle concepts. Initiate modeling and simulation development for the assessment of fuel and energy use.</p> <p><b>FY 2025 Plans:</b> - Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622401, Structures, Next Generation Aerodynamic Technologies effort.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> FY 2025 decreased compared to FY 2024 by \$7.318 million. Funding decreased due to transfer of Next Generation Aerodynamic Technologies effort to PE 0602203F, Aerospace Propulsion, Project 622401 Structures, Next Generation Aerodynamic Technologies effort.</p>				
<p><b>Title:</b> Aircraft Integration Technologies</p> <p><b>Description:</b> Develop enabling technologies to allow efficient and effective integration of propulsion, weapons, and subsystems into current and future air vehicles.</p> <p><b>FY 2024 Plans:</b> Complete integrated full flow path demonstration of a medium bypass embedded engine for next generation mobility. Complete development of hybrid electric distributed propulsion vehicle integration designs for next generation vehicle concepts. Continue development of novel kinetic weapons integration technologies for enhanced weapon payload in attritable platforms. Initiate the development of a modeling and simulation approach to the design and integration of embedded propulsion systems.</p> <p><b>FY 2025 Plans:</b> - Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622401, Structures, Aircraft Integration Technologies.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> FY 2025 decreased compared to FY 2024 by \$17.174 million. Funding decreased due to transfer of Aircraft Integration Technologies effort to PE 0602203F, Aerospace Propulsion, Project 622401 Structures, Aircraft Integration Technologies effort.</p>		16.026	17.174	0.000
<b>Accomplishments/Planned Programs Subtotals</b>		65.729	67.567	0.000
		<b>FY 2023</b>	<b>FY 2024</b>	
<b>Congressional Add:</b> Full scale determinant assembly for hypersonic airframe structures		9.809	-	

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force	<b>Date:</b> March 2024
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<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622401 / <i>Structures</i>
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	FY 2023	FY 2024
<b>FY 2023 Accomplishments:</b> Conduct Congressionally directed efforts. This effort will be executed in Program 0602201F, Aerospace Vehicle Technologies, Project 622401, Structures.		
<b>Congressional Adds Subtotals</b>	9.809	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable.

**UNCLASSIFIED**

**Exhibit R-2A, RDT&E Project Justification:** PB 2025 Air Force **Date:** March 2024

<b>Appropriation/Budget Activity</b> 3600 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602201F / Aerospace Vehicle Technologies				<b>Project (Number/Name)</b> 622403 / Flight Controls and Pilot-Vehicle Interface			
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
622403: <i>Flight Controls and Pilot-Vehicle Interface</i>	-	37.350	39.916	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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

This project develops technologies that enable maximum affordable capability from manned, remotely-piloted, and autonomous aerospace vehicles. Advanced control, automation, and autonomy technologies are developed for maximum vehicle performance throughout the flight envelope and simulated in full-scale, surrogate, and virtual environments. Resulting technologies contribute significantly towards the development of reliable autonomous or remotely piloted air vehicles, hypersonic aircraft, and extended-life legacy aircraft.

In FY 2025, the entirety of PE 0602201F, Aerospace Vehicle Technologies, Project 622403 Flight Controls and Pilot-Vehicle Interface, will be transferred to PE 0602203F, Aerospace Propulsion, Project 622403 Flight Controls and Pilot-Vehicle Interface for increased integration between airframe, flight control, propulsion, electrical, power and thermal management.

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

	FY 2023	FY 2024	FY 2025
<p><b>Title:</b> Advanced Flight Controls Technologies</p> <p><b>Description:</b> Develop technologies for advanced control-enabled capabilities, including flight controls, components, integrated vehicle management systems, and software and system certification techniques for both manned/unmanned and remotely piloted aircraft.</p> <p><b>FY 2024 Plans:</b> Continue the development of a trusted autonomy approach, integrating certification processes and autonomy development. Continue the development, demonstration and assessment of autonomy capabilities for dynamic tasking in complex environments. Initiate the development of autonomy optimization and assurance in dynamic and uncertain environments.</p> <p><b>FY 2025 Plans:</b> - Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622403, Flight Controls and Pilot-Vehicle Interface, Advanced Flight Controls Technologies effort.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> FY 2025 decreased compared to FY 2024 by \$9.478 million. Funding decreased due to transfer of Advanced Flight Controls Technologies effort to PE 0602203F, Aerospace Propulsion, Project 622403, Flight Controls and Pilot-Vehicle Interface, Advanced Flight Controls Technologies effort.</p>	8.672	9.478	0.000
<p><b>Title:</b> Manned and Unmanned Teaming Technologies</p>	22.166	23.144	0.000

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622403 / <i>Flight Controls and Pilot-Vehicle Interface</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<p><b>Description:</b> Develop technology for flight control systems that will permit safe interoperability between manned and remotely piloted aircraft and effective teaming in adverse and contested environments.</p> <p><b>FY 2024 Plans:</b> Continue the development of tactical autonomy for manned-unmanned teams in contested, dynamic mission environments. Continue the development of mission management autonomy for manned-unmanned teams. Continue the development, demonstration and assessment of autonomous behaviors to address mission capability gaps, such as operations of unmanned systems in terminal environments.</p> <p><b>FY 2025 Plans:</b> - Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622403, Flight Controls and Pilot-Vehicle Interface, Manned and Unmanned Teaming Technologies effort.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> - FY 2025 decreased compared to FY 2024 by \$23.144 million. Funding decreased due to transfer of Manned and Unmanned Teaming Technologies effort to PE 0602203F, Aerospace Propulsion, Project 622403, Flight Controls and Pilot-Vehicle Interface, Manned and Unmanned Teaming Technologies effort.</p>				
<p><b>Title:</b> Flight Controls Technologies Modeling and Simulation</p> <p><b>Description:</b> Develop tools and methods for capitalizing on simulation-based research and development of future aerospace vehicles.</p> <p><b>FY 2024 Plans:</b> Continue trade studies of vehicle concepts for strike, mobility and reconnaissance. Continue manned-unmanned teaming evaluations including rapid development of new integrated capabilities. Continue analyses of capability concepts for future advanced development programs. Continue modeling and simulation efforts to assess emerging aerospace technologies and concepts in complex and dynamic battlespace environments. Continue digital engineering efforts to create a digital continuum of military utility and cost effectiveness analysis for investment planning to technology development to technology transition.</p> <p><b>FY 2025 Plans:</b> - Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622403, Flight Controls and Pilot-Vehicle Interface, Flight Controls Technologies Modeling and Simulation effort.</p> <p><b>FY 2024 to FY 2025 Increase/Decrease Statement:</b></p>		6.512	7.294	0.000

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622403 / <i>Flight Controls and Pilot-Vehicle Interface</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
FY 2025 decreased compared to FY 2024 by \$7.294 million. Funding decreased due to transfer of Flight Controls Technologies Modeling and Simulation effort to PE 0602203F, Aerospace Propulsion, Project 622403, Flight Controls and Pilot-Vehicle Interface, Flight Controls Technologies Modeling and Simulation effort.			
<b>Accomplishments/Planned Programs Subtotals</b>	37.350	39.916	0.000

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

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable.

**UNCLASSIFIED**

**Exhibit R-2A, RDT&E Project Justification:** PB 2025 Air Force **Date:** March 2024

<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622404 / <i>Aeromechanics</i>
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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
622404: <i>Aeromechanics</i>	-	9.233	10.135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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

This project develops aerodynamic configurations of a broad range of revolutionary, affordable aerospace vehicles. It matures and applies modeling and numerical simulation methods for fast and affordable aerodynamics prediction and integrates and demonstrates multi-disciplinary advances in airframe, propulsion, weapon, and air vehicle control integration.

In FY 2025, the entirety of PE 0602201F, Aerospace Vehicle Technologies, Project 622404 Aeromechanics, is transferred to PE 0602203F, Aerospace Propulsion, Project 622401 Structures for increased integration between airframe, flight control, propulsion, electrical, power and thermal management.

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

	FY 2023	FY 2024	FY 2025
<b>Title:</b> Aerodynamic Systems Technologies	9.233	10.135	0.000
<b>Description:</b> Develop aerodynamic assessment prediction methods centered on expanding the design capabilities of future air vehicles.			
<b>FY 2024 Plans:</b> Complete design assessments of distributed propulsion concepts for next generation aircraft. Continue the assessment and development of incorporating active flow control techniques into advanced design to enable new aircraft configurations. Continue design assessments of long-endurance unmanned platforms. Continue the development of prediction methods which include air vehicle stability and control requirements.			
<b>FY 2025 Plans:</b> Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622401, Structures, Aerodynamic Systems Technologies effort in order to effectively and efficiently align resources to Aerospace Systems Core Technical Competencies effort.			
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> FY 2025 decreased compared to FY 2024 by \$10.135 million. Funding decreased due to transfer of Aerodynamic Systems Technologies effort to PE 0602203F, Aerospace Propulsion, Project 622401, Structures, Aerodynamic Systems Technologies effort.			
<b>Accomplishments/Planned Programs Subtotals</b>	9.233	10.135	0.000

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

N/A

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622404 / <i>Aeromechanics</i>

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

**Remarks**

**D. Acquisition Strategy**

Not applicable.

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force										<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 3600 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602201F / Aerospace Vehicle Technologies				<b>Project (Number/Name)</b> 622405 / High Speed Systems Technology			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025 Base</b>	<b>FY 2025 OCO</b>	<b>FY 2025 Total</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>FY 2029</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
622405: High Speed Systems Technology	-	62.938	40.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

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

This effort investigates, analyzes, and develops high speed/hypersonic aerospace vehicle technologies. Advanced high temperature structures concepts are explored and developed to exploit new materials, fabrication processes, and design techniques. Advanced aerodynamic vehicle configurations are developed and analyzed through simulations, experiments, and multi-disciplinary analyses. Advanced subsystem, integration and analysis technologies are developed and simulated for hypersonic vehicles. These technologies will enable future high speed weapons and platforms; intelligence, surveillance, and reconnaissance systems; and space access vehicles.

In FY 2025, the entirety of PE 0602201F, Aerospace Vehicle Technologies, Project 622405 High Speed Systems Technology, is transferred to PE 0602203F, Aerospace Propulsion, Project 622405 High Speed Systems Technology for increased integration between airframe, flight control, propulsion, electrical, power and thermal management.

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

	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<b>Title:</b> High Speed Systems Technology	19.692	23.240	0.000
<b>Description:</b> Develop design analysis methods and technologies for high speed systems at extreme flight conditions.			
<b>FY 2024 Plans:</b> Continue critical technology maturation for high speed/ hypersonic systems with primary emphasis on longer range flight and heavier payloads. Continue maturation of innovative aerospace structural concepts, analytical methods, service life predictions, airframe/engine integration, fluid/thermal/structural interactions and thermal management techniques. Continue development of high speed system concepts, including flight research concepts, to provide revolutionary capabilities for affordable expendable systems and robust reusable systems. Continue efforts to characterize high-speed vehicle system phenomena, develop and validate fundamental high-speed component technologies through computational analysis, ground, and flight testing.			
<b>FY 2025 Plans:</b> - Starting in FY 2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622405, High Speed Systems Technology, High Speed Systems Technology effort.			
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force		<b>Date:</b> March 2024		
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622405 / <i>High Speed Systems Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
FY 2025 decreased compared to FY 2024 by \$23.240 million. Funding decreased due to transfer of High Speed Systems Technology effort to PE 0602203F, Aerospace Propulsion, Project 622405, High Speed Systems Technology, High Speed Systems Technology effort.				
<b>Title:</b> High Speed Vehicle Aeromechanics and Integration		13.819	16.786	0.000
<b>Description:</b> Develop new and improved components, concepts, and designs for sustained flight of high-speed/hypersonic expendable and re-useable vehicles. Conduct analyses of high speed/hypersonic vehicles to enable revolutionary capabilities.				
<b>FY 2024 Plans:</b> Continue to mature critical technologies for high speed/hypersonic flight with primary emphasis on longer range and heavier payloads, with secondary emphasis on reusable systems. Continue development of multi disciplinary design and analysis techniques and tools. Continue development of high speed system concepts that provide revolutionary capabilities through configuration research. Continue investigation of aeromechanic technologies to evaluate uncertainty, improve instrumentation accuracy and safe multi-body physics; Complete initial investigation of aeromechanic technologies to reduce drag and achieve robust stability & control at all flight conditions. Continue efforts to characterize high-speed aeromechanics phenomena and develop and validate fundamental high-speed component technologies through computational analysis, ground, and flight testing. Initiate investigation of advanced aeromechanic technologies to extend system range through improvement of system lift/drag ratio and maintain robust stability and control at all flight conditions. Initiate investigation of computational and ground based experimental approaches to improved air induction systems over a wide range of flight conditions.				
<b>FY 2025 Plans:</b> - Starting in FY2025, this work will be performed under PE 0602203F, Aerospace Propulsion, Project 622405, High Speed Systems Technology, High Speed Vehicle Aeromechanics and Integration.				
<b>FY 2024 to FY 2025 Increase/Decrease Statement:</b> FY 2025 decreased compared to FY 2024 by \$16.786 million. Funding decreased due to transfer of High Speed Vehicle Aeromechanics and Integration effort to PE 0602203F, Aerospace Propulsion, Project 622405, High Speed Systems Technology, High Speed Vehicle Aeromechanics and Integration effort.				
<b>Accomplishments/Planned Programs Subtotals</b>		33.511	40.026	0.000
		<b>FY 2023</b>	<b>FY 2024</b>	
<b>Congressional Add:</b> Program increase - educational agreement partnership for aerospace engineering security integration		9.809	-	

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 622405 / <i>High Speed Systems Technology</i>

	FY 2023	FY 2024
<b>FY 2023 Accomplishments:</b> Conduct Congressionally directed efforts. This effort will be executed in Program 0602201F, Aerospace Vehicle Technologies.		
<b>Congressional Add:</b> Program increase: educational partnership agreement for secure UAV technologies	9.809	-
<b>FY 2023 Accomplishments:</b> Conduct Congressionally directed efforts. This effort will be executed in Program 0602201F, Aerospace Vehicle Technologies, Project 622405, High Speed Systems Technology.		
<b>Congressional Add:</b> Program increase: collaborative hypersonic demonstration	9.809	-
<b>FY 2023 Accomplishments:</b> Conduct Congressionally directed efforts. This effort will be executed in Program 0602201F, Aerospace Vehicle Technologies, Project 622405, High Speed Systems Technology.		
<b>Congressional Adds Subtotals</b>	29.427	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2025 Air Force **Date:** March 2024

<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 625172 / <i>NUCLEAR SYSTEM TECHNOLOGY</i>
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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
625172: <i>NUCLEAR SYSTEM TECHNOLOGY</i>	-	3.348	3.624	5.235	0.000	5.235	4.958	5.061	5.219	5.328	Continuing	Continuing

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

This project provides sustaining S&T to preserve nuclear deterrence for future generations, develops complimentary projects to inform future systems, establishing inter-agency partnerships for Modeling & Simulation (M&S) and test platforms, and coordinates with existing programs for next generation strategic systems development and test platforms.

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

	FY 2023	FY 2024	FY 2025
<p><b>Title:</b> Nuclear Technologies</p> <p><b>Description:</b> Develop nuclear-related technologies to support National requirements for nuclear deterrence operations including environmental modeling and simulation on re-entry systems.</p> <p><b>FY 2024 Plans:</b> Initiate development of nuclear re-entry systems modeling and simulation coordinated with PE 0603273F. Continue development and testing of advanced numerical methods for implementation of dynamic techniques for improved event discrimination and characterization for local and regional seismic events. Continue developing earth models and statistical approaches to the behavior of discriminants for local and regional seismic events. Continue model and algorithm development and testing of detection techniques to advance the ground-based seismic nuclear monitoring mission through improved anomaly detection, attribution, and protection. Continue enhanced seismic monitoring with distributed acoustic sensing with machine learning data analysis approach to analyze geometries for noise reduction. Initiate new advanced waveform tomography with 3D source simulations, linear wave propagation simulations and earth structure models to enhance prediction capabilities.</p> <p>Continue aerothermal model validation and development through various testing mechanisms to include the development of integrated end-to-end physics-based modeling suite to predict aerodynamic flow fields, signatures, and material characterizations. Continue to improve modeling fidelity of plasma chemistry through machine learning models for product state distributions. Continue analysis of strategic command, control, and communications to identify space-layer technologies of interest.</p> <p><b>FY 2025 Plans:</b> - Continue development of nuclear re-entry systems M&amp;S coordinated with efforts in PE 0603273F. - Continue development and testing of advanced numerical methods for implementation of dynamic techniques for improved event discrimination and characterization for local and regional seismic events.</p>	3.348	3.624	5.235

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force		<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / <i>Aerospace Vehicle Technologies</i>	<b>Project (Number/Name)</b> 625172 / <i>NUCLEAR SYSTEM TECHNOLOGY</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>
<ul style="list-style-type: none"> <li>- Continue developing earth models and statistical approaches to the behavior of discriminants for local and regional seismic events.</li> <li>- Continue model and algorithm development and testing of detection techniques to advance the ground-based seismic nuclear monitoring mission through improved anomaly detection, attribution, and protection.</li> <li>- Continue enhanced seismic monitoring with distributed acoustic sensing with machine learning data analysis approach to analyze geometries for noise reduction.</li> <li>- Continue advanced waveform tomography with 3D source simulations, linear wave propagation simulations and earth structure models to enhance prediction capabilities.</li> <li>- Continue aerothermal model validation and development through various testing mechanisms to include the development of integrated end-to-end physics-based modeling suite to predict aerodynamic flow fields, signatures, and material characterizations.</li> <li>- Continue to improve modeling fidelity of plasma chemistry through machine learning models for product state distributions.</li> <li>- Continue advanced development of modeling and simulation tools used in predicting the physics-based effects that result in leading edge shape change of hypersonic vehicles. Initiate weather effects testing on reentry vehicles to gather data for validating current modeling and simulation tools, and for generating new algorithms used for predicting how a reentry vehicle reacts to harsh weather in low atmosphere.</li> <li>- Continue analysis of strategic command, control, and communications to identify space-layer technologies of interest.</li> <li>- Continue development of test and integration plans for hypersonic reentry flight testing of government payloads</li> <li>- Initiate prototype flight test of government technology payload to inform creation of government testbed in coordination with efforts in PE 0603273F.</li> <li>- Continue development of hypersonic technology payloads, to include inertial sensors, mm-Wave communications, spectral and hyperspectral sensors, and heatshield materials, to mature during flight test activities.</li> <li>- Initiate validation of M&amp;S results of hypersonic aerothermal chemistry and shock-layer behavior with experimental flight test data.</li> </ul> <p><b><i>FY 2024 to FY 2025 Increase/Decrease Statement:</i></b>  FY 2025 increased compared to FY 2024 by \$1.611 million due to increase in experimentation and integration activities related to development of government flight test bed to support Government Reference Design and nuclear system Science and Technology activities.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	3.348	3.624	5.235

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2025 Air Force			<b>Date:</b> March 2024
<b>Appropriation/Budget Activity</b> 3600 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602201F / Aerospace Vehicle Technologies	<b>Project (Number/Name)</b> 625172 / NUCLEAR SYSTEM TECHNOLOGY	

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

<u>Line Item</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u> <u>Base</u>	<u>FY 2025</u> <u>OCO</u>	<u>FY 2025</u> <u>Total</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>FY 2029</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 03 0603273F: <i>Science &amp; Technology for Nuclear Re-entry Systems</i>	39.431	70.162	87.945	-	87.945	118.933	155.791	161.244	-	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

Not applicable