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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army **Date:** March 2023

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0607137A / Chinook Product Improvement Program
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	65.960	67.513	9.265	-	9.265	4.929	12.894	8.943	9.043	Continuing	Continuing
ES4: Chinook Product Improvement Program	-	65.960	67.513	9.265	-	9.265	4.929	12.894	8.943	9.043	Continuing	Continuing

Program MDAP/MAIS Code: 577

A. Mission Description and Budget Item Justification

Program Element (PE) 0607137A Chinook Product Improvement Program is critical to achieving heavy lift for the Army of 2030 Operational capability. With an increased payload and operational reach, the CH-47F Block II is the only platform that can lift the Joint Light Tactical Vehicle (JLTV), M777 and medium girder bridge to enable Army of 2030 Forces to Compete, Penetrate, Disintegrate, and Exploit at operationally relevant distances.

The CH-47F Block II acquisition program upgrades existing CH-47F aircraft and procures common hardware that exists between the CH-47F and MH-47G aircraft. The CH-47F Block II program reduces O&S costs and provides additional capability to the field with greater reach, increased payload capability and an increase in maximum gross weight to 54,000 pounds. CH-47F Block II upgrades include a strengthened airframe, improvements to rotor, fuel, and electrical systems, which will improve safety and reliability for the aircraft. The program updates the Common Avionics Architecture System (CAAS) and Digital Advanced Flight Control System (DAFCS) software packages of the aircraft and incorporates other avionics changes introduced into the final CH-47F production lots. Along with providing significantly increased capability to the field, the program includes provisions for anticipated future upgrades as well as weight and cost savings initiatives to ensure the Army has a platform with the flexibility and performance needed to meet the needs of Army of 2030 Operations.

The Cargo Project Management Office awarded the CH-47F Block II Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase produced three production representative test articles to support an acquisition decision. This phase includes contractor and government led ground and flight system level qualification testing, which requires Electromagnetic Environmental Effects (E3), operation assessments, and aircraft subsystem Live-Fire Test and Evaluation (LFTE). On 27 September 2021, the Army provided direction to remove the Advanced Chinook Rotor Blade (ACRB) from the CH-47F Block II system configuration, and replace them with the currently fielded Fiberglass Rotor Blades (FRB) for the duration of the EMD phase.

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B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	67.872	52.513	9.461	-	9.461
Current President's Budget	65.960	67.513	9.265	-	9.265
Total Adjustments	-1.912	15.000	-0.196	-	-0.196
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	15.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.912	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.196	-	-0.196

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

Project: ES4: *Chinook Product Improvement Program*

Congressional Add: *Program increase - Lightweight Ballistic Protection System*

Congressional Add: *Program increase - CH-47 Engine Enhancement*

	FY 2022	FY 2023
	8.000	-
	7.500	15.000
Congressional Add Subtotals for Project: ES4	15.500	15.000
Congressional Add Totals for all Projects	15.500	15.000

Change Summary Explanation

Decreased funding to support higher Army priorities.

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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
ES4: <i>Chinook Product Improvement Program</i>	-	65.960	67.513	9.265	-	9.265	4.929	12.894	8.943	9.043	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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The Cargo Project Management Office awarded the CH-47F Block II Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase produced three production representative test articles to support an acquisition decision. This phase includes contractor and government led ground and flight system level qualification testing, which requires Electromagnetic Environmental Effects (E3), operation assessments, and aircraft subsystem Live-Fire Test and Evaluation (LFTE). On 27 September 2021, the Army provided direction to remove the Advanced Chinook Rotor Blade (ACRB) from the CH-47F Block II system configuration, and replace them with the currently fielded Fiberglass Rotor Blades (FRB) for the duration of the EMD phase.

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

	FY 2022	FY 2023	FY 2024
Title: CH-47F Block II Engineering and Manufacturing Development (EMD)	18.908	1.526	-
Description: Conduct and support aircraft development, complete assembly and deliver three EMD test articles to include airframe components, Improved Drive Train (IDT), Improved Rotor System (IRS), light weight fuel system, electrical components and the currently fielded FRB. Complete fabrication, assembly, and initial functional checks of the Ground Test Vehicle (GTV) and remote control system (RCS); conduct GTV test operations, functional testing of the CH-47F Block II systems, and Test Readiness Review (TRR) for EMD ground and flight testing. Release EMD flight test software. Perform contractor led system level ground and flight testing. Deliver documentation that demonstrates requirements verification and production configuration			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>baseline. Continue Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) support for initial flight test activities. Shut down all ACRB efforts and terminate the associated contracts.</p> <p>FY 2023 Plans: Continue development of EMD flight test analysis and reporting deliverables in support of System Verification Review (SVR), system qualification, and an Army production decision.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: The decrease of \$1.526 in FY23 to \$0 in FY24 due to the ramping down of CH-47F Block II EMD deliverables and qualification activities to support an Army production decision.</p>				
<p>Title: Matrix and Contractor Support</p> <p>Description: This funding provides support costs for various government agencies, contractor support and matrix organizations supporting the Block II Engineering and Manufacturing Development (EMD) program with systems engineering, test support, airworthiness certification, project management, general engineering, logistics and business support.</p> <p>FY 2023 Plans: Continues funding support costs for various government agencies, contractor support, and other matrix organizations supporting CH-47F Block II EMD program.</p> <p>FY 2024 Plans: Continue funding for various government agencies, contractor support, and other matrix organizations in support of CH-47F Block II EMD activities, design, system engineering, fabrication, and Integrated Logistics Support (ILS) in support of production- aircraft configuration, corrective hardware and software actions.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: The decrease of \$5.584 supports the ramp down of the system verification effort in support of the EMD phase.</p>		6.282	6.600	1.016
<p>Title: Testing and Evaluation</p> <p>Description: This effort supports component and system level testing to qualify design improvements in the airframe, fuel system, avionics, drive train, and rotor subsystem. Block II improvements are validated through component endurance, testing of IDT, IRS, Live Fire Test and Evaluation (LFTE), Electromagnetic Environmental Effects (E3), and future test activities.</p> <p>FY 2023 Plans: Continues system level testing on the CH-47 Block II FRB configuration to support system qualification and assessment of mitigations implemented to address technical challenges discovered during previous EMD phase testing events. Conduct</p>		8.084	28.346	7.249

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2022	FY 2023	FY 2024
<p>Common Avionics Architecture System (CAAS) and Digital Advanced Flight Control System (DAFCS) software testing, in both laboratory and flight test environments, to support government acceptance of production aircraft. Plan for future developmental, operational, and cyber test activities. Conduct CH-47F Block II Operational Assessment and satisfy new program requirement to conduct Live Fire, Phase III testing of the Fiberglass Rotor Blades (FRB).</p> <p>FY 2024 Plans: Continue engineering support and mitigations for technical challenges discovered during EMD phase test events. Incorporate mitigations and improvements onto the production aircraft. Continue system level validation and verification of production aircraft configuration in preparation of future operational testing. Complete testing of DAFCS software to provide improved system handling qualities in support of operational test and fielding. Testing includes hardware and software modifications to the software integration laboratories (SIL) for software testing of production aircraft configuration.</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: The decrease of \$21.097 is due to the ramp down activities associated with the EMD phase such as, Live Fire and Ballistics Testing and Analysis, GTV support, and Flight Control Computer (FCC) testing.</p>				
<p>Title: System Support</p> <p>Description: Conduct design, system engineering, fabrication, and ILS in support of production aircraft configuration, corrective hardware and software actions that are required to address technical challenges identified in the EMD phase. Conduct requirements update and verification efforts resulting from CH-47F Block II system configuration change from ACRB to FRB. Support test efforts to improve production aircraft operational availability and reduce maintenance costs. Conduct modifications of production aircraft and other test assets to support component and system level testing events. Implement corrective hardware and software actions that are required to address technical challenges identified during testing of the production aircraft. Perform system level verification and validation of production aircraft configuration in preparation for future operational testing. Deliver documentation in support of a material release that enables system fielding.</p> <p>FY 2023 Plans: Continue the requirement and verification updates resulting from CH-47F Block II system configuration change from ACRB to FRB. Continue engineering support and implementation of mitigations for technical challenges discovered during EMD phase testing events. Initiate system level verification and validation of production aircraft configuration in preparation for future operational testing. Complete hardware and software modifications to include software integration laboratories (SIL) in order to support production-aircraft configuration software testing. Pursue incorporation of Modular Open Systems Architecture (MOSA) into aircraft systems.</p> <p>FY 2024 Plans:</p>		17.186	14.124	1.000

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2022	FY 2023	FY 2024
Continue the qualification of Government Furnished Equipment in support of production aircraft. This includes updates to the Aviation Mission Planning Systems to support SIL testing, developmental flight test activities, and pre-Initial Operational Test and Evaluation (IOT&E) activities. Additionally, a tool to support the previously mentioned activities is the Cargo Engineering Analysis Cockpit (CH-EAC), where the CH-EAC provides a virtual capability to perform Crew Station Working Groups (CSWGs). The CSWGs are conducted by actual pilot Subject Matter Experts (SMEs) in the field and the SMEs are brought into the CH-EAC facility to help evaluate software and avionics changes and how that impacts pilot workload. FY 2023 to FY 2024 Increase/Decrease Statement: The decrease of \$13.124 is due to completion of activities in support of production verification of C&A, Embedded Flight Performance Model (EPPM) updates, and Flight scene update.			
Title: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) Transfer Description: Funding transferred in accordance with Title 15 USC §638 FY 2023 Plans: Funding transferred in accordance with Title 15 USC §638 FY 2023 to FY 2024 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC §638	-	1.917	-
Accomplishments/Planned Programs Subtotals	50.460	52.513	9.265

	FY 2022	FY 2023
Congressional Add: Program increase - Lightweight Ballistic Protection System FY 2022 Accomplishments: Congressional increase for Lightweight Ballistics Protection System	8.000	-
Congressional Add: Program increase - CH-47 Engine Enhancement FY 2022 Accomplishments: Congressional increase for CH-47 Engine Enhancement. FY 2023 Plans: Congressional increase for CH-47 Engine Enhancement	7.500	15.000
Congressional Adds Subtotals	15.500	15.000

C. Other Program Funding Summary (\$ in Millions)			<u>FY 2024</u>	<u>FY 2024</u>	<u>FY 2024</u>						<u>Cost To</u>
<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Base</u>	<u>OCO</u>	<u>Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Complete</u>	<u>Total Cost</u>
• A05105: CH-47 SLEP	333.677	387.898	221.423	-	221.423	234.008	224.396	176.014	168.744	Continuing	Continuing

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

<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u> <u>Base</u>	<u>FY 2024</u> <u>OCO</u>	<u>FY 2024</u> <u>Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

FY 2020 A05008 OCO is for Army Common MH-47G New Build War Replacement Aircraft Block II procurement.
 FY 2021 A05008 OCO is for CH-47F New Build War Replacement Aircraft Block I procurement.
 FY 2020 A05105 All Funding is for Army Common MH-47G RENEW Aircraft Block II procurement.
 FY 2021 A05105 Funding is for 6 Army Common MH-47G RENEW Aircraft Block II procurement.
 FY 2021 A05105 Funding is for 4 CH-47F RENEW Aircraft Block II procurement.
 FY 2022 A05105 Funding is for 6 Army Common MH-47G RENEW Aircraft Block II procurement.
 FY 2022 A05105 Funding is for 2 CH-47F RENEW Aircraft Block II procurement.
 FY 2023 A05105 Funding is for 6 Army Common MH-47G RENEW Aircraft Block II procurement.
 FY 2023 A05105 Funding is for 3 CH-47F RENEW Aircraft Block II procurement.

D. Acquisition Strategy

Inducted CH-47F Block I aircraft receive consolidated separate engineering change proposals for a single CH-47F Block II upgrade, which provides an increased maximum gross weight of 54,000 pounds. The CH-47F Block II program provides additional benefits to increase commonality and interoperability between the two platforms, improve design life, lower maintenance cost, enhance reliability, safety, airworthiness, and cybersecurity. The CH-47F Block II program restores payload lost through mission equipment package (MEP) growth and enhances flight control systems, while providing the most effective procurement alternative to maintain heavy lift capability and reduce Operation and Support (O&S) costs.

Quantity of RDT&E Articles:

FY 2017 - Awarded: 1 - Ground Test Vehicle (GTV), 2 - CH-47F Block II Prototypes
 FY 2019 - Awarded: 1 - CH-47F Block II Prototype

 FY 2019 - Delivered: 1 - GTV, 2 - CH-47F Block II Prototypes
 FY 2020 - Delivered: 1 - CH-47F Block II Prototype

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Army													Date: March 2023		
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)						
2040 / 7				PE 0607137A / Chinook Product Improvement Program					ES4 / Chinook Product Improvement Program						
Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SBIR/STTR Transfer	TBD	To Be Determined : To Be Determined	-	-		1.917	Sep 2023	-		-		-	0.000	1.917	-
Subtotal			-	-		1.917		-		-		-	0.000	1.917	N/A
Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Manufacturing Development (EMD)	SS/CPIF	Boeing Ridley : Park, PA	350.360	18.908	Nov 2021	1.526	Nov 2022	-		-		-	0.000	370.794	-
System Support	TBD	To Be Determined : To Be Determined	-	17.186	Mar 2022	14.124	Jun 2023	1.000	May 2024	-		1.000	0.000	32.310	-
Congressional Add Program Increase CH-47 Engine Enhancement	TBD	To Be Determined : To Be Determined	-	7.500	Aug 2022	15.000	Aug 2023	-		-		-	0.000	22.500	-
Congressional Add Program Increase Block II Lightweight Improvements	TBD	To Be Determined : To Be Determined	6.500	8.000	Aug 2022	-		-		-		-	0.000	14.500	-
Subtotal			356.860	51.594		30.650		1.000		-		1.000	0.000	440.104	N/A
Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Support	Various	Various Government and contractor : RSA & Huntsville, AL, Aberdeen Proving Ground MD,	34.211	6.282	Oct 2021	6.600	Oct 2022	1.016	Oct 2023	-		1.016	Continuing	Continuing	Continuing
Subtotal			34.211	6.282		6.600		1.016		-		1.016	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Army												Date: March 2023			
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0607137A / Chinook Product Improvement Program				Project (Number/Name) ES4 / Chinook Product Improvement Program							
Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing and Evaluation	Various	Boeing Ridley : Park PA and Various Government	59.839	8.084	Nov 2021	28.346	Nov 2022	7.249	Nov 2023	-		7.249	Continuing	Continuing	Continuing
Subtotal			59.839	8.084		28.346		7.249		-		7.249	Continuing	Continuing	N/A
			Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			450.910	65.960		67.513		9.265		-		9.265	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / Chinook Product Improvement Program	Project (Number/Name) ES4 / Chinook Product Improvement Program

Event Name	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
CH-47F Block II EMD																																				
CH-47F Block II EMD																																				
Program Support																																				
Program Support																																				
Testing and Evaluation																																				
Testing and Evaluation																																				
System Support																																				
System Support																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>	Project (Number/Name) ES4 / <i>Chinook Product Improvement Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Improved Drive Train (IDT)	3	2014	4	2021
Transportable Flight Proficiency Simulator (TFPS)	2	2018	4	2020
Milestone B	3	2017	3	2017
CH-47F Block II EMD	4	2017	2	2024
Program Support	1	2017	4	2028
Advanced Chinook Rotor Blade (ACRB)	1	2011	4	2021
Testing and Evaluation	3	2015	2	2028
System Support	3	2022	4	2028