Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607137A *I Chinook Product Improvement Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	164.820	49.409	52.372	-	52.372	-	-	-	-	-	-
ES4: *Chinook Product Improvement Program*	-	164.820	49.409	52.372	-	52.372	-	-	-	-	-	-
Program MDAP/MAIS Code: 577												

A. Mission Description and Budget Item Justification

Program Element (PE) 0607137A Chinook Product Improvement Program is critical to achieving the Army's heavy lift Joint All Domain Operational capability. With an increased payload and operational reach, the CH-47F Block II is the only platform that can lift the JLTV, M777 and medium girder bridge to enable Joint All Domain 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 for Special Operations Forces. The CH-47F Block II program provides additional capability to the field with greater reach, increased payload capability and an increase in maximum gross weight to 54,000 pounds. These improvements are based on airframe and subcomponent changes. Specifically, the Advanced Chinook Rotor Blades will increase lift in high-hot conditions while improved flight control and drive train components will both increase aircraft performance and reduce O&S costs. The program updates the Common Avionics Architecture System and Digital Advanced Flight Control System systems of the aircraft and incorporates other avionics changes introduced into the final CH-47F production lots. CH-47F Block II will also include a strengthened airframe which introduces commonality with the MH-47G and improvements to rotor, fuel, and electrical systems which will improve safety and reliability for the aircraft. Along with providing a 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 Joint All Domain Operations until a Heavy Future Vertical Lift variant is fielded.

The Cargo Project Management Office awarded the CH-47F Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase produced three production representative test articles to support contractor and government led system level qualification testing. The contractor led system level qualification testing includes both ground and flight test. The government led system level qualification testing includes Electromagnetic Environmental Effects (E3), Limited User Test (LUT), and aircraft subsystem Live-Fire Test and Evaluation (LFTE).

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0607137A *I Chinook Product Improvement Program*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	171.471	46.091	2.050	-	2.050
Current President's Budget	164.820	49.409	52.372	-	52.372
Total Adjustments	-6.651	3.318	50.322	-	50.322
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-6.651	-1.682			
• Adjustments to Budget Years	-	-	50.322	-	50.322

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: ES4: *Chinook Product Improvement Program*		
Congressional Add: *Program Increase - Expandable Rotorcraft Diagnostics*	3.300	-
Congressional Add: *Program increase - Block II Lightweight Improvements*	6.500	-
Congressional Add: *Program increase - carbon composite materials for helicopter wheels and brakes*	-	5.000
Congressional Add Subtotals for Project: ES4	9.800	5.000
Congressional Add Totals for all Projects	9.800	5.000

Change Summary Explanation

Increase in PB22 due to continuation of flight test operations in support of EMD system level qualification and Matrix and Contractor Support needed to align support requirements for approved development activities.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army											Date: May 2021	
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*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
ES4: *Chinook Product Improvement Program*	-	164.820	49.409	52.372	-	52.372	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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The Cargo Project Management Office awarded the CH-47F Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase produced three production representative test articles to support contractor and government led system level qualification testing. The contractor led system level qualification testing includes both ground and flight test. The government led system level qualification testing includes Electromagnetic Environmental Effects (E3), Limited User Test (LUT), and aircraft subsystem Live-Fire Test and Evaluation (LFTE).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022**
Title: Improved Drive Train (IDT)	7.587	-	-
Description: This effort modernizes the CH-47 drive train by implementing design changes to operate at a higher power level to maximize engine power available, increase performance and restore payload lost through mission equipment package (MEP) growth. Additionally, this effort addresses Operations and Support (O&S) cost reductions while fully qualifying the improved drive train at the component level.			
Title: Transportable Flight Proficiency Simulator (TFPS)	1.000	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: The Transportable Flight Proficiency Simulator (TFPS) is a certified transportable flight trainer featuring a high fidelity visual display, detailed cockpit representation and motion cueing seats. It is capable of training mission tasks and emergency procedures and provides a cost savings when compared to using aircraft for these purposes. The TFPS will increase safety and mitigate risk to Block II Limited User Test (LUT) aircrews by allowing pilots to train aircraft differences in modifications, handling qualities, performance and human factors considerations before actual flight is performed. Training in the TFPS reduces LUT timelines and improves aircrew proficiency as confirmed in the CH-47F (Block I) Phase 2 User Test Report. The initial Block II TFPS will also serve as building block for upgrading the fielded TFPSs to the Block II configuration.			
Title: CH-47F Block II Engineering and Manufacturing Development (EMD)	112.485	19.081	35.682
Description: Conduct and support aircraft development, complete assembly and deliver three EMD test articles to include Advanced Chinook Rotor Blade (ACRB), airframe components, Improved Drive Train (IDT), rotor components, light weight fuel system and electrical components. Complete fabrication, assembly, 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, Test Readiness Review (TRR) for EMD ground and flight testing. Release EMD flight test software. Begin contractor led system level ground and flight testing. Deliver documentation that demonstrates requirements verification and production configuration baseline. Continue Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) support for initial flight test activities. ***FY 2021 Plans:*** Mitigate technical challenges realized during system level test and continue system and component level qualification testing. Receipt and disposition of contract requirements to include test reports, qualification by similarity (QBS), Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) deliverables, and delivery of draft Production Configuration Baseline. ***FY 2022 Plans:*** Continue flight test operations in support of EMD system level qualification and initiate post flight test reporting requirements. Receipt and disposition of contract requirements to include test reports, qualification by similarity (QBS), Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) deliverables, and delivery of Production Configuration Baseline. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The 2022 increase of $16.601 million is the continuation of flight test operations in support of EMD system level qualification.			
Title: Matrix and Contractor Support	6.738	3.811	4.073
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.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: Continues funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD Program. ***FY 2022 Plans:*** Continues funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD program. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The FY2022 increase of $0.262 million aligns support requirements for FY22 approved development activities.			
Title: Advanced Chinook Rotor Blade (ACRB) ***Description:*** This effort designs, develops and performs contractor led component qualification for an improved rotor blade capability. This capability significantly increases lift capability, improves reliability, and is a form, fit replacement for the current blade, which will enable payload restoration to the ground force commander. Conduct additional flight testing to reduce risk for Engineering and Manufacturing Development (EMD) and validate Computational Fluid Dynamics (CFD) and Computational Structural Dynamics (CSD) models. ***FY 2021 Plans:*** Continue to build and test ACRB specimens in support of full component qualification. Begin specimen fabrication in support of material allowables test. ***FY 2022 Plans:*** Continue to build and test ACRB specimens to support full component qualification. Conduct engineering updates at completion of flight test for final design of the ACRB. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The FY2022 decrease of $6.416 million to support ACRB Component full qualification and coupon testing.	8.619	13.300	6.884
Title: Testing and Evaluation ***Description:*** This effort supports component and system level testing to qualify design improvements in the airframe, fuel system, avionics, drive train, rotor subsystem, and Advanced Chinook Rotor Blade (ACRB). Block II improvements will be validated through component endurance, testing of IDT, IRS, Live Fire Test and Evaluation (LFTE), Electromagnetic Environmental Effects (E3), Limited User Test (LUT), and developmental flight test activities. ***FY 2021 Plans:***	18.591	8.217	5.733

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Perform system level testing to address the technical challenges of the CH-47F Block II aircraft components in order to improve aircraft operational availability and reduce maintenance costs. Continue ballistic and live fire test and evaluation. ***FY 2022 Plans:*** Continue to perform system level testing to address the technical challenges of the CH-47F Block II aircraft components in order to improve aircraft operational availability and reduce maintenance costs. Continue live fire test and evaluation. Initiate the Limited User Test activities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The FY2022 decrease of $2.484 million to support Limited User Testing (LUT) and Live Fire Activities.			
Accomplishments/Planned Programs Subtotals	155.020	44.409	52.372

	FY 2020	FY 2021
Congressional Add: Program Increase - Expandable Rotorcraft Diagnostics ***FY 2020 Accomplishments:*** Program increase - expandable rotorcraft diagnostics	3.300	-
Congressional Add: Program increase - Block II Lightweight Improvements ***FY 2020 Accomplishments:*** Block II Lightweight Improvements	6.500	-
Congressional Add: Program increase - carbon composite materials for helicopter wheels and brakes ***FY 2021 Plans:*** Carbon Composite materials for helicopter wheels and brakes	-	5.000
Congressional Adds Subtotals	9.800	5.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A05105: *CH-47 SLEP*	177.137	368.122	163.777	-	163.777	-	-	-	-	-	-
• A05008: *CH-47 NEW BUILD*	25.000	50.472	-	-	-	-	-	-	-	-	-

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 procurement.
FY 2020 A05105 All Funding is for Army Common MH-47G RENEW Block II procurement.
FY 2021 A05105 Funding is for 6 Army Common MH-47G RENEW Block II procurement.
FY 2021 A05105 Funding is for 5 CH-47F RENEW Block II procurement.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost

FY 2022 A05105 Funding is for 6 Army Common MH-47G RENEW Block II procurement.

D. Acquisition Strategy

Consolidated separate engineering change proposals into a single Block II upgrade to the CH-47F Block I. Current CH-47F Block I aircraft will enter into SLEP program to increase maximum gross weight to 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 2018 - 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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Manufacturing Development (EMD)	SS/CPIF	Boeing Ridley : Park, PA	216.918	112.485	Dec 2019	24.081	Jun 2021	35.682	Nov 2021	-		35.682	Continuing	Continuing	Continuing
Advanced Chinook Rotor Blade (ACRB)	SS/CPFF	Boeing Ridley : Park PA	59.075	8.619	Nov 2019	13.300	Jul 2021	6.884	Mar 2022	-		6.884	Continuing	Continuing	Continuing
Improved Drive Train (IDT)	SS/CPFF	Boeing Ridley : Park, PA	45.475	7.587	Nov 2019	-		-		-		-	0.000	53.062	-
Transportable Flight Proficienct Simulator (TFPS)	MIPR	NAVAIR : Patuxent River NAS, MD	22.215	1.000	May 2020	-		-		-		-	0.000	23.215	-
FY 2019 NDAA SEC 825 MDAP Cost Overrun	Allot	To Be Determined : To Be Determined	0.020	-		-		-		-		-	0.000	0.020	-
Congressional Add Program Increase Expandable Rotorcraft Diagnostics	TBD	To Be Determined : To Be Determined	-	3.300		-		-		-		-	0.000	3.300	-
Congressional Add Program Increase Block II Lightweight Improvements	TBD	To Be Determined : To Be Determined	-	6.500		-		-		-		-	0.000	6.500	-
		Subtotal	343.703	139.491		37.381		42.566		-		42.566	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix and Contractor Support from External Sources	Various	Various Government and contractor : RSA & Huntsville, AL, Aberdeen Proving Ground MD,	22.447	6.738	Oct 2019	3.811	Oct 2020	4.073	Oct 2021	-		4.073	Continuing	Continuing	Continuing
		Subtotal	22.447	6.738		3.811		4.073		-		4.073	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing and Evaluation	Various	Boeing Ridley : Park PA and Various Government	32.039	18.591	Dec 2019	8.217	Dec 2020	5.733	Nov 2021	-		5.733	Continuing	Continuing	Continuing
		Subtotal	32.039	18.591		8.217		5.733		-		5.733	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	398.189	164.820		49.409		52.372		-		52.372	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
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*

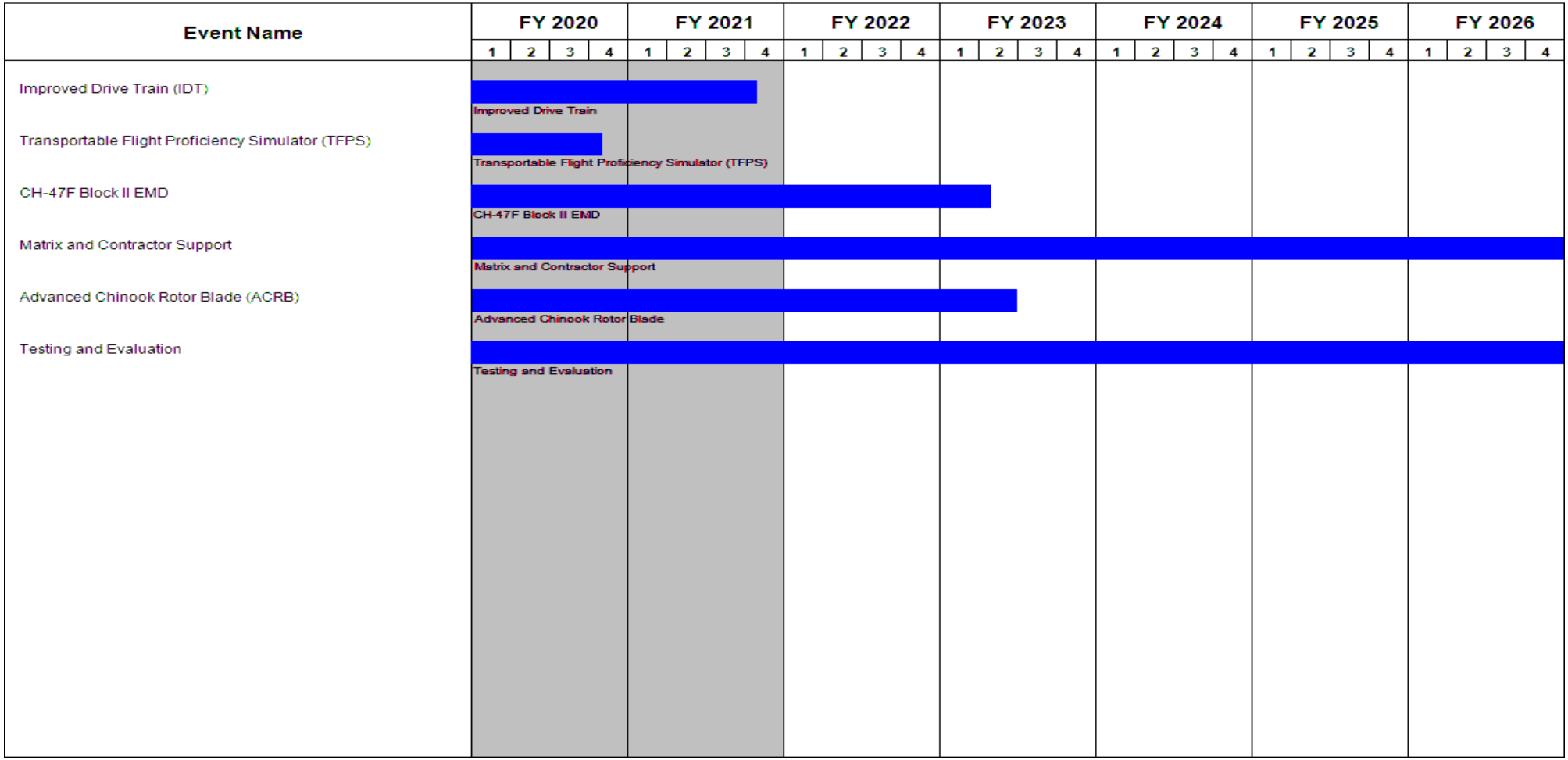

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

Schedule Details

	Start		End	
Events	**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	2023
Matrix and Contractor Support	1	2017	4	2026
Advanced Chinook Rotor Blade (ACRB)	1	2011	2	2023
Testing and Evaluation	3	2015	4	2026