Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020	
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*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	-	139.003	171.471	46.091	-	46.091	2.050	1.998	1.020	2.164	Continuing	Continuing
ES4: *Chinook Product Improvement Program*	-	139.003	171.471	46.091	-	46.091	2.050	1.998	1.020	2.164	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 the Army's heavy lift Multi-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 Multi-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 Multi-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 will produce three production representative test articles to support a Milestone C decision in the 4th quarter of Fiscal Year (FY) 2021. This phase will include 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 2021 Army					Date: February 2020
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 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**
Previous President's Budget	144.722	174.371	46.136	-	46.136
Current President's Budget	139.003	171.471	46.091	-	46.091
Total Adjustments	-5.719	-2.900	-0.045	-	-0.045
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-12.700			
• Congressional Rescissions	-	-			
• Congressional Adds	-	9.800			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-5.719	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.045	-	-0.045

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
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 Subtotals for Project: ES4	-	9.800
Congressional Add Totals for all Projects	-	9.800

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
ES4: *Chinook Product Improvement Program*	-	139.003	171.471	46.091	-	46.091	2.050	1.998	1.020	2.164	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Program Element (PE) is critical to achieving the Army's heavy lift Multi-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 Multi-Domain Forces to Compete, Penetrate, Disintegrate, and Exploit at operationally relevant distances.

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Improved Drive Train (IDT)	9.471	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.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY 2020 Plans: Performed contractor led component qualification to support forward and aft rotor shaft fatigue testing. Documented test results to support full airworthiness component qualification. Additionally, this testing identified component useful life necessary to support flight test. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The FY 2021 decrease of $7.587 is due to the completion of IDT component qualification testing.					
Title: Transportable Flight Proficiency Simulator (TFPS) ***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. ***FY 2020 Plans:*** Built, certified, tested, and relocated the Transportable Flight Proficiency Simulator to prepare for training. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The FY2021 decrease of $1.000 is due to the delivery of the initial Block II TFPS.	12.300	1.000	-	-	-
Title: CH-47F Block II Engineering and Manufacturing Development (EMD) ***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.	89.749	112.485	20.763	-	20.763

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY 2020 Plans: Continued Engineering and Manufacturing Development (EMD) system level ground and flight testing to support full airworthiness qualification. Developed technical publications, provisioning and training for operators and maintainers. Developed material solutions and fielding plan for ground support equipment. Performed maintenance demonstration, requirements traceability and system verification. Utilized the Ground Test Vehicle (GTV) to support dynamic live fire testing. ***FY 2021 Base Plans:*** Finalize system and component level qualification testing. Receipt and disposition of all 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 2020 to FY 2021 Increase/Decrease Statement:*** The FY 2021 decrease of $91.722 million is due to the completion of the bulk of scheduled Non-Recurring Engineering (NRE), completion of ground and flight testing at multiple off-site locations, reduction in manpower and material to support ground and flight testing, and the delivery of contract deliverable data and files supporting these activities.					
Title: Matrix and Contractor Support ***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. ***FY 2020 Plans:*** Continued funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD Program. ***FY 2021 Base Plans:*** Continues funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD Program. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The FY 2020 decrease of $2.927 aligns support requirements for FY21 approved development activities.	7.163	6.738	3.811	-	3.811
Title: Advanced Chinook Rotor Blade (ACRB)	9.858	8.619	13.300	-	13.300

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: This effort designs, develops and performs contractor led component qualification for an improved rotor blade capability. This capability significantly increases lift capability, reduces Operation and Support (O&S) costs 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 2020 Plans:*** Conducted engineering analysis of Advanced Chinook Rotor Blade (ACRB) design changes resulting from Block II flight testing. Continued structural testing and development of material allowables in support of ACRB full component qualification. ***FY 2021 Base Plans:*** Conduct engineering updates at completion of flight test for final design of the Advanced Chinook Rotor Blade (ACRB). Develop material allowables in support of ACRB full component qualification. Build qualification blades in support of full qualification testing. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The 2020 increase of $4.681 is due to engineering updates, blade build and full component qualification testing.					
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 2020 Plans:*** Transitioned from contractor led flight testing to government led flight testing of three production representative test aircraft for system level performance and airworthiness qualification. Continued Advanced Chinook Rotor Blade (ACRB) live fire testing and conduct system level live fire testing at Army Research Laboratory (ARL). Concluded system level Electromagnetic Environmental Effects (E3) and ground developmental testing. Completed coordination and initiated execution support for Limited User Test (LUT). ***FY 2021 Base Plans:***	10.452	18.591	8.217	-	8.217

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Complete the Limited User Test activities. Maintain GTV for operational use and complete all remaining Live Fire activities. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** FY 2021 decrease of $10.374 as planned due to completion of the majority of EMD flight test qualification prior to the execution of the Limited User Test (LUT).					
Title: FY 2018 NDAA SEC 825 MDAP Cost Overrun ***Description:*** FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.010	-	-	-	-
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	6.651	-	-	-
Accomplishments/Planned Programs Subtotals	139.003	161.671	46.091	-	46.091

	FY 2019	FY 2020
Congressional Add: Program Increase - Expandable Rotorcraft Diagnostics ***FY 2020 Plans:*** Program Increase - Expandable Rotorcraft Diagnostics	-	3.300
Congressional Add: Program increase - Block II Lightweight Improvements ***FY 2020 Plans:*** Program increase - Block II Lightweight Improvements	-	6.500
Congressional Adds Subtotals	-	9.800

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• A05105: *CH-47 SLEP*	140.056	177.137	179.122	-	179.122	165.933	183.503	194.159	196.538	Continuing	Continuing
• A05008: *CH-47 NEW BUILD*	-	25.000	0.000	50.472	50.472	-	-	-	-	0.000	75.472

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost

Remarks

100% of the A05105 is Army Common MH-47G RENEW Block II procurement.
FY 2020 A05008 OCO is Army Common MH-47G New Build War Replacement Aircraft Block II procurement.
FY 2021 A05008 OCO is CH-47F New Build War Replacement Aircraft procurement.

D. Acquisition Strategy

The Cargo Program Management Office (PMO) is executing a block strategy to facilitate incremental upgrades to ensure performance necessary to meet the needs of the Multi-Domain Operations (MDO) until a Heavy Future Vertical Lift (FVL) variant is fielded. The Block II program will restore performance lost due to the added weight of safety and survivability equipment incorporated since initial fielding in 2007. Additional objectives of the Block II program include: efficiently incorporating multiple engineering changes, accomplishing required mid-life airframe recapitalization, converging the special operations and conventional Army designs, establishing a foundation for future block upgrades, and maintaining the industrial base until a Heavy FVL is realized.

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 - Scheduled Delivery: 1 - GTV, 2 - CH-47F Block II Prototypes
FY 2020 - Scheduled Delivery: 1 - CH-47F Block II Prototype

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		6.651		-		-		-	0.000	6.651	-
		Subtotal	-	-		6.651		-		-		-	0.000	6.651	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Manufacturing Development (EMD)	SS/CPIF	Boeing Ridley : Park, PA	127.179	89.739	Dec 2018	112.485	Dec 2019	20.763	Dec 2020	-		20.763	Continuing	Continuing	Continuing
Advanced Chinook Rotor Blade (ACRB)	SS/CPFF	Boeing Ridley : Park PA	49.217	9.858	Dec 2018	8.619	Nov 2019	13.300	Dec 2020	-		13.300	Continuing	Continuing	Continuing
Improved Drive Train (IDT)	SS/CPFF	Boeing Ridley : Park, PA	36.004	9.471	Dec 2018	7.587	Nov 2019	-		-		-	0.000	53.062	-
Transportable Flight Proficienct Simulator (TFPS)	MIPR	NAVAIR : Patuxent River NAS, MD	9.915	12.300	May 2019	1.000	May 2020	-		-		-	Continuing	Continuing	-
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	222.315	121.388		139.491		34.063		-		34.063	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 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,	15.284	7.163	Oct 2018	6.738	Oct 2019	3.811	Oct 2020	-		3.811	Continuing	Continuing	Continuing
		Subtotal	15.284	7.163		6.738		3.811		-		3.811	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing and Evaluation	Various	Boeing Ridley : Park PA and Various Government	21.587	10.452	Dec 2018	18.591	Dec 2019	8.217	Dec 2020	-		8.217	Continuing	Continuing	Continuing
		Subtotal	21.587	10.452		18.591		8.217		-		8.217	Continuing	Continuing	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	259.186	139.003		171.471		46.091		-		46.091	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
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*

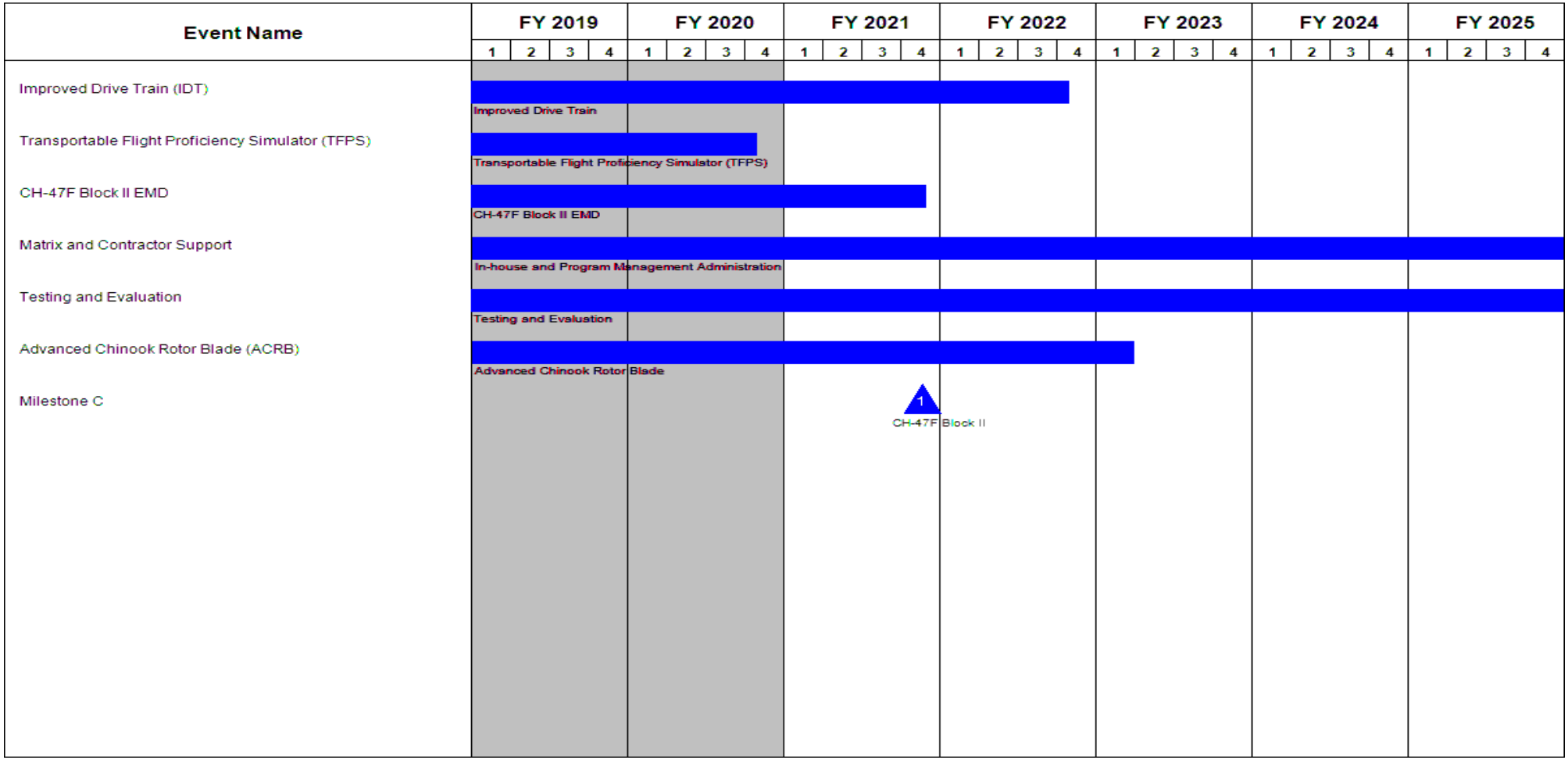

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Improved Drive Train (IDT)	3	2014	4	2022
Transportable Flight Proficiency Simulator (TFPS)	2	2018	4	2020
Milestone B	3	2017	3	2017
CH-47F Block II EMD	4	2017	4	2021
Matrix and Contractor Support	1	2017	4	2025
Testing and Evaluation	3	2015	4	2025
Advanced Chinook Rotor Blade (ACRB)	1	2011	1	2023
Milestone C	4	2021	4	2021