Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army											Date: February 2018	
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 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	88.314	194.567	157.822	-	157.822	174.371	49.178	32.641	34.817	0.000	731.710
ES4: *Chinook Product Improvement Program*	-	88.314	194.567	157.822	-	157.822	174.371	49.178	32.641	34.817	0.000	731.710

A. Mission Description and Budget Item Justification

The CH-47 Chinook is the Army's only heavy lift helicopter and is an essential element of the Army Aviation portfolio strategy. This program budget activity funds improvements to the CH-47F System that include the transition from individual Engineering Change Proposals (ECPs) to a CH-47F Block II program of record. Engineering/Manufacturing Design (EMD) contract awarded July 2017. EMD phase will produce three production representative test articles to support a Milestone C decision in 4th quarter FY 2021. Additionally, funding supports: continued development and testing of the Advanced Chinook Rotor Blades (ACRB) to increase lift in high/hot conditions, and improvements to flight control and drive train components to increase aircraft performance and reduce Operation and Support (O&S) costs.

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	91.848	194.567	131.124	-	131.124
Current President's Budget	88.314	194.567	157.822	-	157.822
Total Adjustments	-3.534	0.000	26.698	-	26.698
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.489	-			
• GP SEC 8025 FFRDC	-0.045	-	-	-	-
• CH-47F RECAP ACP	-	-	26.698	-	26.698

Change Summary Explanation

FY 2017 funds have been adjusted -.450 million for GP SEC 8025 FFRDC -3.489 SBR/STTR
FY 2019 program increase for 26.698 million for Block II EMD and Test and Evaluation efforts

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
ES4: *Chinook Product Improvement Program*	-	88.314	194.567	157.822	-	157.822	174.371	49.178	32.641	34.817	0.000	731.710
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The CH-47 Chinook is the Army's only heavy lift helicopter and is an essential element of the Army Aviation portfolio strategy. This program budget activity funds improvements to the CH-47F System that include the transition from individual Engineering Change Proposals (ECPs) to a CH-47F Block II program of record. Engineering/Manufacturing Design (EMD) contract awarded July 2017. EMD phase will produce three production representative test articles to support a Milestone C decision in 4th quarter FY 2021. Additionally, funding supports: continued development and testing of the Advanced Chinook Rotor Blades (ACRB) to increase lift in high/hot conditions, and improvements to flight control and drive train components to increase aircraft performance and reduce Operation and Support (O&S) costs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Modernization Integration	15.404	4.400	-	-	-
Description: Continued system integration non-recurring engineering prior to EMD. Developed the Air Vehicle Airworthiness Qualification Specification (AQS) and EMD Disposition Document completion of manufacturing tool designs for specific cockpit and cabin positions. Updated weight and balance information. Generated and provided structural, stress, and fatigue substantiation. Created manufacturing tool orders for all zones and prepared them for release. Generated preliminary manufacturing planning for the Block II Air Vehicle. Continued Ground Test Vehicle (GTV) design work. Released engineering to support test article development. ***FY 2018 Plans:*** This effort will continue to develop and finalize a test article design that converts a CH-47D aircraft to a GTV; continue Block II Common Avionics Architecture System (CAAS) coordination and vehicle interface planning; and update weight and balance data with the latest design inputs. Additionally, the effort will finalize Reliability and Maintainability (R&M) and safety analyses; structural, stress, and fatigue substantiation; vehicle level drawings and assemblies (including alignment definitions). Complete all manufacturing tooling designs. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding decrease due to CH-47F ECPs transitioning to the Block II Program.					
Title: Electronic Control Unit (ECU) Software Upgrade	2.697	3.840	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Description: Software upgrade improves engine communication with the aircraft monitoring system to increase aircrew situational awareness and reduce workload. In addition software enhancements accommodate increased capability of the Improved Drive Train (IDT). Software upgrades will occur at designated intervals to allow efficient and expedient fielding of any improvements/enhancements. ***FY 2018 Plans:*** Complete qualification testing and integration of Version 3+ ECU software with Block II aircraft. Conduct Electromagnetic Environmental Effects (E3) and engine testing on the Hydro Mechanical Assembly improvements. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding decrease due to R&D ECU Software upgrade program complete.					
Title: Improved Drive Train (IDT) ***Description:*** This effort addresses O&S cost reduction while simultaneously re-qualifying the combining, forward, and aft transmissions to a higher power level to maximize engine power available at sea-level conditions. ***FY 2018 Plans:*** Continue test preparation. Continue test execution for the forward transmission, static/dynamics strain surveys test, sync shaft fatigue tests. Initiate qualification endurance, overstress, gear tooth bending fatigue test for aft/forward transmission. Initiate reduced lubrication and oil out test planning for aft/combiner/forward transmissions. ***FY 2019 Base Plans:*** Complete test preparation. Complete qualification test for the aft transmission, overstress test, gear tooth bending fatigue test, reduced lubrication and oil out testing. Document results of aft transmission qualification testing. Complete qualification test for the forward transmission, gear tooth bending fatigue test, reduced lubrication and oil out testing. Document results of forward transmission qualification testing. Complete qualification test for the combiner transmission, reduced lubrication and oil out testing. Document results of combiner transmission qualification testing. ***FY 2018 to FY 2019 Increase/Decrease Statement:***	6.842	19.500	7.700	-	7.700

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Funding decrease due to completion of testing on the IDT.					
Title: Transportable Flight Proficiency Simulator (TFPS) ***Description:*** The TFPS is a certified trainer using high fidelity, motion cueing, transportable, flight simulator capable of training to include training for mission tasks and emergency procedures and provides flying hour dollars savings. The Block II TFPS is required to safely support initial trainer and operator aircrew training for the Limited User Test (LUT) and beyond. The TFPS will decrease risk to unit aircrew and trainers by allowing them to train with the new design modifications, handling quality changes and pilot visibility differences versus learning in aircraft. Training in the TFPS significantly reduces LUT timelines and improves aircrew proficiency as confirmed in the CH-47F (Block I) Phase 2 User Test Report. Additionally, the initial TFPS serves as a prototype for the remainder of the required TFPS upgrades. ***FY 2018 Plans:*** Redesign of the existing CH-47F TFPS to incorporate Block II changes and order bulk of materials. ***FY 2019 Base Plans:*** Continue integration of hardware and software components. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding decrease due to completion of initial TFPS to support Block II.	-	28.838	3.723	-	3.723
Title: CH-47F Block II Engineering and Manufacturing Development (EMD) ***Description:*** Description: The EMD contract award July 2017 which will develop affordable and executable manufacturing processes, complete system fabrication, remanufacture three production representative CH-47F Block II Chinook test articles, and reduce program risk. ***FY 2018 Plans:*** Conduct System Level Delta Preliminary Design Review (PDR) and System Level Critical Design Review (CDR). Conduct and support aircraft development and assembly to include ACRB, airframe components, Improved Drive Train (IDT) and rotor components, light weight fuel system and electrical components. Deliver documentation that demonstrates requirements verification and production configuration baseline. Initiate building of the GTV. ***FY 2019 Base Plans:***	34.964	107.726	110.052	-	110.052

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Complete building of the GTV and conduct the GTV testing. Complete building test aircraft. Conduct Test Readiness Review (TRR) for EMD flight testing. Release of EMD flight test software. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding increase due to Block II approval to the ACP.					
Title: In-house and Program Management Administration ***Description:*** This funding provides support costs for various government agencies. ***FY 2018 Plans:*** Continue funding support costs for various government agencies in addition to funding for Project Management Office Full Time Equivalent (FTE) employees supporting the Block II development Program. ***FY 2019 Base Plans:*** Continue funding support costs for various government agencies in addition to funding for Project Management Office FTE employees and other matrix organizations supporting the Block II development Program. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding changes meet R&D requirements as program ramps to LRIP.	4.547	13.874	13.767	-	13.767
Title: Advanced Chinook Rotor Blade (ACRB) ***Description:*** This effort provides an ACRB which is a redesign of the current rotor blade to provide improved capability. It improves high/hot performance, reduces Operations and Support (O&S) costs and is a form, fit, function replacement for the legacy blade. ***FY 2018 Plans:*** Complete build of ACRB blades to support component level qualification testing. Commence testing of material coupons (samples) for component structural testing and development of material allowables in support of ACRB full qualification requirements. Begin preparation of blades for live fire static and quasi static testing. Begin building blades to support the ACRB dynamic Live Fire Test and Evaluation (LFTE). ***FY 2019 Base Plans:*** Complete material coupon testing. Finalize fatigue, stress and material allowable reports to support EMD Airworthiness Release (AWR). ***FY 2018 to FY 2019 Increase/Decrease Statement:***	12.828	14.368	13.779	-	13.779

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Funding decrease due to CH-47F ACRB completing final testing.					
Title: Testing and Evaluation	11.032	2.021	8.801	-	8.801
Description: This effort supports component level and system level testing to qualify design improvement in the airframe, fuel system, avionics, drive train, rotor subsystem, and ACRB. Through endurance, live-fire, E3, and limited user, testing and evaluation activities will validate Block II improvements. ***FY 2018 Plans:*** Emplacement of a GTV fixture and endurance testing of the IDT and Improved Rotor Subsystem ***FY 2019 Base Plans:*** Begin system level LFTE excluding ACRB LFTE. Initiate system level developmental testing (ie E3 and ground test). Initiate planning of Limited User Test (LUT). ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding increase due to LFTE and LUT.					
Accomplishments/Planned Programs Subtotals	88.314	194.567	157.822	-	157.822

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• AA0252: *CH-47 CARGO HELICOPTER MODS*	102.943	20.166	7.807	-	7.807	11.785	23.957	15.092	15.697	Continuing	Continuing
• A05105: *CH-47 SLEP (Including Adv Proc)*	553.257	70.740	99.278	25.000	124.278	128.644	332.421	300.324	417.570	Continuing	Continuing
• A05008: *CH-47 CARGO HELICOPTER NEW BUILD*	-	131.836	0.000	-	0.000	-	-	-	-	0.000	131.836

Remarks

The Block II program will restore performance lost due to the added weight of safety and survivability equipment incorporated since initial fielding of the CH-47F Block I in 2007. The CH-47F Block II will also increase the operational envelope allowing more to be carried at high hot conditions.

D. Acquisition Strategy

Given the need to maintain the Chinook fleet's sustained relevance until replaced, the PM is proposing a block strategy to facilitate incremental upgrades. 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

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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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 Future Vertical Lift (FVL)-Heavy is realized.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Support	C/T&M	Various : Redstone Arsenal AL	-	-		2.663	Oct 2018	-		-		-	0.000	2.663	-
		Subtotal	-	-		2.663		-		-		-	0.000	2.663	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Modernization Integration	SS/CPFF	Boeing Ridley : Park PA	15.477	15.404	Nov 2016	4.400		-		-		-	Continuing	Continuing	Continuing
Engineering and Manufacturing Development (Pre-Decisional)	SS/CPIF	Boeing Ridley : Park, PA	-	34.964	Jul 2017	107.726	Dec 2017	110.052	Dec 2018	-		110.052	Continuing	Continuing	Continuing
Advanced Chinook Rotor Blade (ACRB)	SS/CPFF	Boeing Ridley : Park PA	18.695	12.828	Mar 2017	14.368	Nov 2017	13.779	Nov 2018	-		13.779	Continuing	Continuing	Continuing
Improved Drive Train	SS/CPFF	Boeing Ridley : Park, PA	11.662	6.842	Oct 2016	19.500	Nov 2017	7.700	Nov 2018	-		7.700	Continuing	Continuing	Continuing
Electronic Control Unit (ECU) Software Upgrade	SS/CPFF	Honeywell : Phoenix, AZ	5.910	2.697	Apr 2017	3.840	Apr 2018	-		-		-	Continuing	Continuing	Continuing
Ratio Detector Power Supply (RDPS)	SS/CPFF	Boeing Ridley : Park, PA	5.570	-		-		-		-		-	0.000	5.570	-
Transportable Flight Proficienct Simulator (TFPS)	MIPR	NAVAIR : Patuxent River NAS, MD	-	-		28.838		3.723		-		3.723	Continuing	Continuing	-
		Subtotal	57.314	72.735		178.672		135.254		-		135.254	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PMO/OGA	Various	Various Government : Redstone Arsenal AL	3.391	4.547	Oct 2016	11.211	Oct 2017	13.767	Oct 2018	-		13.767	Continuing	Continuing	Continuing
		Subtotal	3.391	4.547		11.211		13.767		-		13.767	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing of configuration update ECPs to include the Advanced Chinook Rotor Blades	SS/CPFF	Boeing Ridley : Park PA	5.841	11.032	Jul 2017	2.021	Dec 2017	8.801	Dec 2018	-		8.801	Continuing	Continuing	Continuing
		Subtotal	5.841	11.032		2.021		8.801		-		8.801	Continuing	Continuing	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	66.546	88.314		194.567		157.822		-		157.822	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
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*

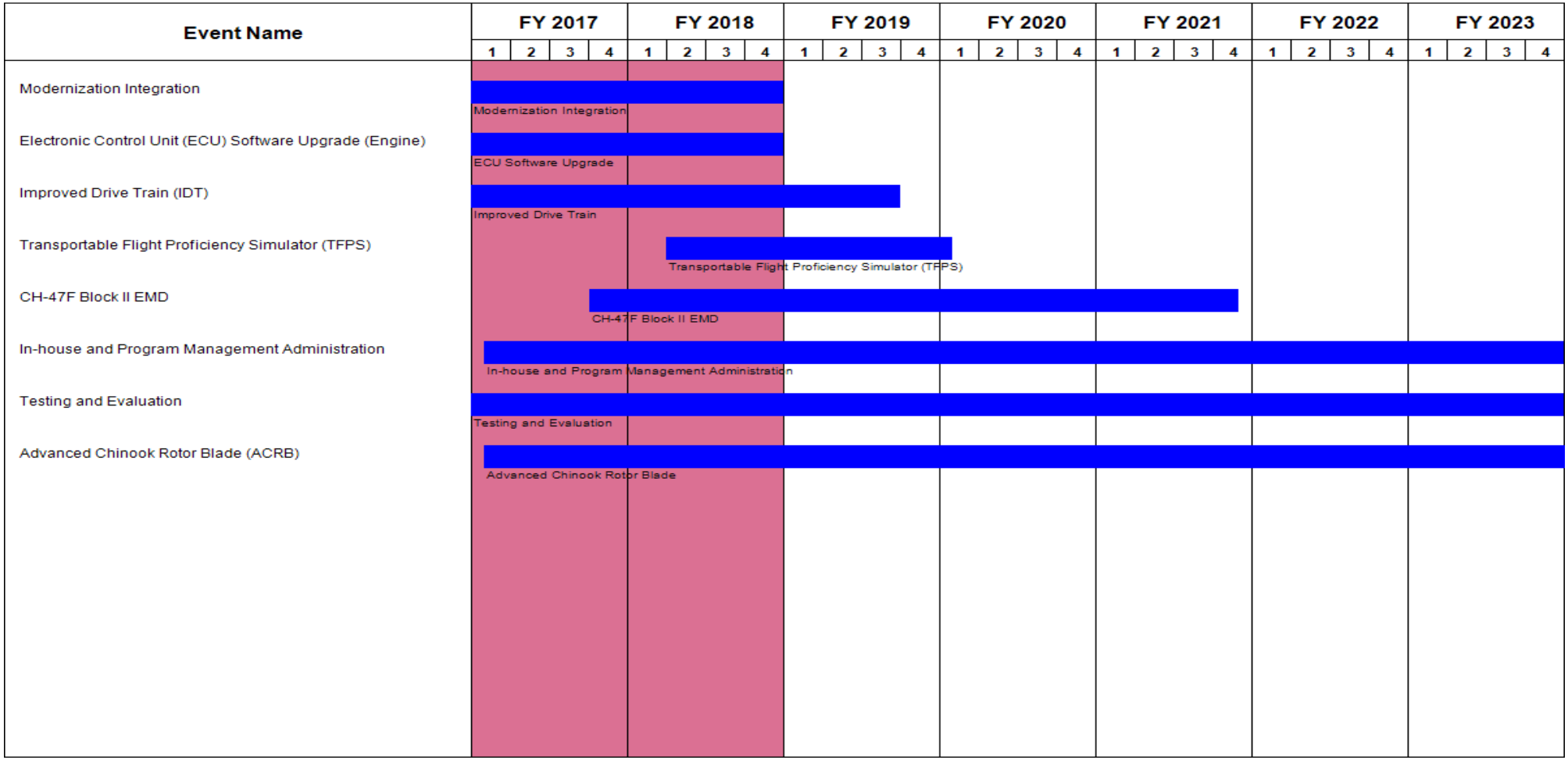

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Modernization Integration	3	2015	4	2018
Electronic Control Unit (ECU) Software Upgrade (Engine)	4	2010	4	2018
Improved Drive Train (IDT)	3	2014	3	2019
Transportable Flight Proficiency Simulator (TFPS)	2	2018	1	2020
CH-47F Block II EMD	4	2017	4	2021
In-house and Program Management Administration	1	2016	4	2023
Testing and Evaluation	3	2015	4	2023
Advanced Chinook Rotor Blade (ACRB)	1	2010	1	2024