RCS: DD-A&T(Q&A)823-577

CH-47F Modernized Cargo Helicopter (CH-47F Block II)

As of FY 2021 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

Table of Contents

Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance
ACAT - Acquisition Category
ADM - Acquisition Decision Memorandum
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
$B - Billions of Dollars
BA - Budget Authority/Budget Activity
Blk - Block
BY - Base Year
CAPE - Cost Assessment and Program Evaluation
CARD - Cost Analysis Requirements Description
CDD - Capability Development Document
CLIN - Contract Line Item Number
CPD - Capability Production Document
CY - Calendar Year
DAB - Defense Acquisition Board
DAE - Defense Acquisition Executive
DAMIR - Defense Acquisition Management Information Retrieval
DoD - Department of Defense
DSN - Defense Switched Network
EMD - Engineering and Manufacturing Development
EVM - Earned Value Management
FOC - Full Operational Capability
FMS - Foreign Military Sales
FRP - Full Rate Production
FY - Fiscal Year
FYDP - Future Years Defense Program
ICE - Independent Cost Estimate
IOC - Initial Operational Capability
Inc - Increment
JROC - Joint Requirements Oversight Council
$K - Thousands of Dollars
KPP - Key Performance Parameter
LRIP - Low Rate Initial Production
$M - Millions of Dollars
MDA - Milestone Decision Authority
MDAP - Major Defense Acquisition Program
MILCON - Military Construction
N/A - Not Applicable
O&M - Operations and Maintenance
ORD - Operational Requirements Document
OSD - Office of the Secretary of Defense
O&S - Operating and Support
PAUC - Program Acquisition Unit Cost

PB - President's Budget
PE - Program Element
PEO - Program Executive Officer
PM - Program Manager
POE - Program Office Estimate
RDT&E - Research, Development, Test, and Evaluation
SAR - Selected Acquisition Report
SCP - Service Cost Position
TBD - To Be Determined
TY - Then Year
UCR - Unit Cost Reporting
U.S. - United States
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)

Program Information

Program Name
CH-47F Modernized Cargo Helicopter (CH-47F Block II)

DoD Component

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References

SAR Baseline (Development Estimate)

Army Acquisition Executive (AAE) Approved Acquisition Program Baseline (APB) dated February 01, 2018

Approved APB

Army Acquisition Executive (AAE) Approved Acquisition Program Baseline (APB) dated February 1, 2018

Mission and Description

The CH-47F Block II 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 capacity 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.

Executive Summary

Program Highlights Since Last Report

The 2018 SAR reported schedule and cost breaches prematurely, which are being corrected with this submission. Funding in the FY 2020 PB is adequate to meet cost, schedule and performance of the Engineering and Manufacturing Development (EMD) phase of the program as planned, however it does not provide funding to react to discrepancies found during testing. CH-47F Block II requirements are stable. Funding reductions in the FY2021 PB may result in cost and/or schedule breaches.

On November 7, 2019, CH-47F Block II test aircraft completed first test flight with Advanced Chinook Rotor Blades representing the complete Block II baseline configuration.

The second CH-47F Block II test aircraft was delivered, has completed instrumentation, and has begun initial flight testing, completing 22.6 cumulative flight hours.

On January 8, 2020, CH-47F Block II test aircraft arrived at Naval Air Station Patuxent River for Electromagnetic Environment Effects Testing and testing was initiated on 13 January, 2020.

There are no significant software-related issues with this program at this time.

History of Significant Developments Since Program Initiation

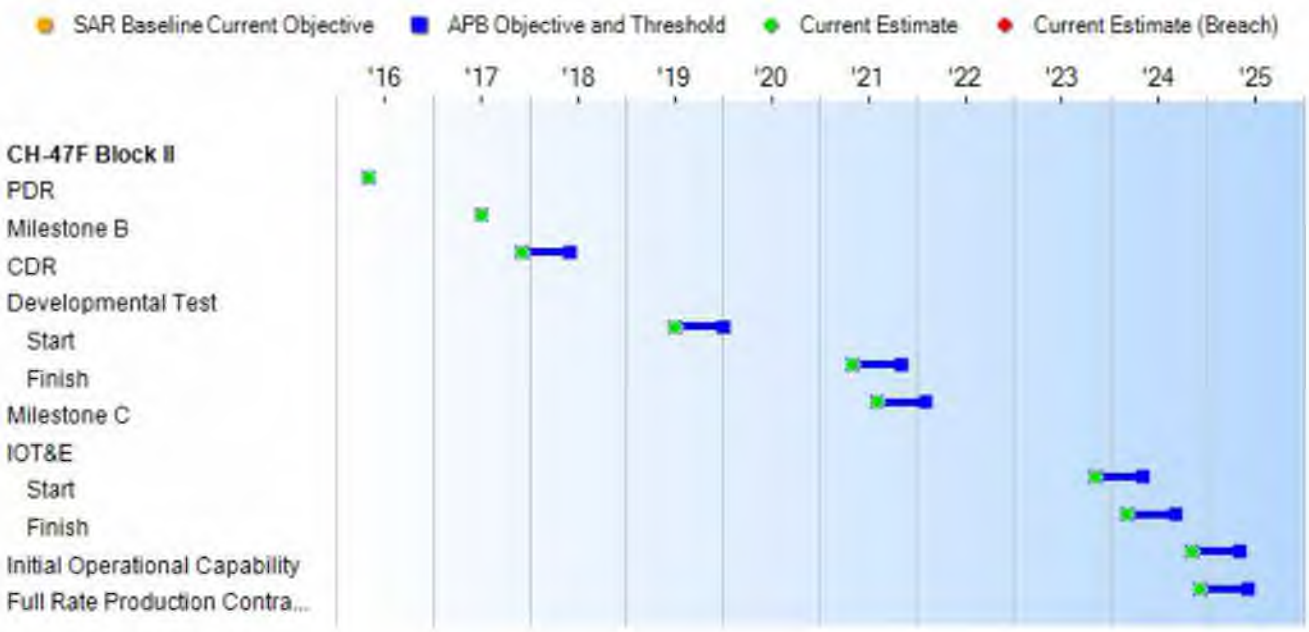
History of Significant Developments Since Program Initiation	
Date	**Significant Development Description**
July 2017	The Army Acquisition Executive ADM approved Milestone B, authorizing the CH-47F Block II program to enter EMD and designating the CH-47F Block II as ACAT IC.
July 2017	The CH-47F Block II EMD contract was awarded to The Boeing Company.
December 2017	System Critical Design Review was completed.
June 2018	First Block II test aircraft loaded was loaded onto the main assembly line at Boeing Philadelphia.
August 2018	The second Block II test aircraft loaded was loaded onto the main assembly line at Boeing Philadelphia.
November 2018	The third Block II test aircraft loaded was loaded onto the main assembly line at Boeing Philadelphia.

Threshold Breaches

APB Breaches		
Schedule		☐
Performance		☐
Cost	RDT&E	☐
	Procurement	☐
	MILCON	☐
	Acq O&M	☐
O&S Cost		☐
Unit Cost	PAUC	☐
	APUC	☐

Nunn-McCurdy Breaches		
Current UCR Baseline		
	PAUC	None
	APUC	None
Original UCR Baseline		
	PAUC	None
	APUC	None

Schedule



Schedule Events					
Events	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate	
PDR	May 2016	May 2016	May 2016	May 2016	
Milestone B	Jul 2017	Jul 2017	Jul 2017	Jul 2017	
CDR	Dec 2017	Dec 2017	Jun 2018	Dec 2017	
Developmental Test					
Start	Jul 2019	Jul 2019	Jan 2020	Jul 2019	
Finish	May 2021	May 2021	Nov 2021	May 2021	
Milestone C	Aug 2021	Aug 2021	Feb 2022	Aug 2021	
IOT&E					
Start	Nov 2023	Nov 2023	May 2024	Nov 2023	(Ch-1)
Finish	Mar 2024	Mar 2024	Sep 2024	Mar 2024	(Ch-1)
Initial Operational Capability	Nov 2024	Nov 2024	May 2025	Nov 2024	(Ch-1)
Full Rate Production Contract Award	Dec 2024	Dec 2024	Jun 2025	Dec 2024	(Ch-1)

Change Explanations

(Ch-1) The 2018 SAR reported schedule breaches prematurely, which are being corrected with this submission. Funding in the FY 2020 PB is adequate to meet cost, schedule and performance of the Engineering and Manufacturing Development (EMD) phase of the program as planned, however it does not provide funding to react to discrepancies found during testing. CH-47F Block II requirements are stable. Funding reductions in the FY2021 PB may result in cost and/or schedule breaches.

Notes

1/ Developmental Test consists of Integrated Test and Limited User Test. Integrated Test begins with the start of baseline aircraft data collection.

Acronyms and Abbreviations

CDR - Critical Design Review
IOT&E - Initial Operational Test & Evaluation
PDR - Preliminary Design Review

Performance

Performance Characteristics				
SAR Baseline Development Estimate	**Current APB Development Objective/Threshold**	**Demonstrated Performance**		**Current Estimate**
Self-deploy with 30 minute fuel reserve (NM)				
1260	1260	1056		1260
Transport 16,000 lbs of internal/external cargo at 4K/95F with 30 minute reserve (NM)				
100	100	50		100
Transport combat equipped troops:				
Number of Troops				
44	44	31		44
Range (NM)				
150	150	100		150
Reliability:				
Mean Time Between Essential Maintenance Actions (MTBEMA) (flt hrs)				
3.5	3.5	3.3		3.5
Maintenance:				
Total Maintenance Ratio (mmh/flt hr)				
9.2	9.2	9.8		9.2

Requirements Reference

ORD Revision 4 dated January 26, 2006

Change Explanations

None

Acronyms and Abbreviations

F - Farenheit
flt - flight
hrs - hours
K - Kilometer
lbs - pounds
mmh - maintenance man hour
NM - nautical mile

Track to Budget

RDT&E

Appn	BA	PE
Army	2040 07	0607137A

Project	Name
ES4	Chinook Product Improvement Program.

Notes: Funding for the CH-47F Block II program began in FY 2015.

Procurement

Appn	BA	PE
Army	2031 01	0210104A

Line Item	Name
A05105	CH-47 SLEP

Notes: Funding for the CH-47F Block II program began in FY 2017.

Appn	BA	PE
Army	2031 02	0210104A

Line Item	Name	
AA0252	CH-47 Cargo Helicopter Mods	(Sunk)

Acq O&M

Appn	BA	PE
Army	2020 04	0702806A

Subactivity Group	Name	
435	Acquisition and Management Support: Cargo Helicopter	(Shared)

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 2017 $M			BY 2017 $M	TY $M		
	SAR Baseline Development Estimate	Current APB Development Objective/Threshold		Current Estimate	SAR Baseline Development Estimate	Current APB Development Objective	Current Estimate
RDT&E	766.2	766.2	842.8	762.8	815.8	815.8	811.2
Procurement	15208.8	15208.8	16729.7	15092.9	21425.2	21425.2	21296.2
Flyaway	--	--	--	14632.4	--	--	20662.1
Recurring	--	--	--	14314.7	--	--	20322.0
Non Recurring	--	--	--	317.7	--	--	340.1
Support	--	--	--	460.5	--	--	634.1
Other Support	--	--	--	415.1	--	--	565.7
Initial Spares	--	--	--	45.4	--	--	68.4
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	244.8	244.8	269.3	246.3	327.7	327.7	329.8
Total	16219.8	16219.8	N/A	16102.0	22568.7	22568.7	22437.2

Current APB Cost Estimate Reference

Army Cost Position dated April 05, 2017

Cost Notes

A revised Project Office Estimate was completed on February 10, 2020 and identified the following program risks, the potential impacts of the risks on program cost, and approaches to mitigate the risks.

1) If the Block II aircraft weight is higher than expected, then there may be a potential risk to mission performance. Mitigation: Monitor aircraft weight growth, incentivize weight reduction in contract, review load and fatigue assumptions, and pursue weight reduction initiatives.

2) If H-47 industrial base is not kept in operation, then cost for H-47 production and support will increase. Mitigation: Use Indefinite Delivery Indefinite Quantity contract to sustain production line, support Technology Applications Program Office production and encourage Foreign Military Sales.

3) The FY 2018 - 2020 DoD Appropriations Acts reduced RDT&E funding by $66.7M. This limits the ability to react to component or flight test deficiencies. Mitigation: Defer funding of non-time critical activities. Defer emerging component qualification and flight test activities to the post MS C time frame.

The 2018 SAR reported cost breaches prematurely, which are being corrected with this submission. Funding in the FY 2020 PB is adequate to meet cost, schedule and performance of the Engineering and Manufacturing Development (EMD) phase of the program as planned, however it does not provide funding to react to discrepancies found during testing. CH-47F Block II requirements are stable. Funding reductions in the FY2021 PB may result in cost and/or schedule breaches.

Total Quantity			
Quantity	SAR Baseline Development Estimate	Current APB Development	Current Estimate
RDT&E	3	3	3
Procurement	539	539	539
Total	542	542	542

Cost and Funding

Funding Summary

Appropriation Summary FY 2021 President's Budget / December 2019 SAR (TY$ M)									
Appropriation	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
RDT&E	514.2	174.4	49.2	32.6	34.8	5.3	0.7	0.0	811.2
Procurement	435.5	175.0	379.5	365.5	501.2	713.7	760.4	17965.4	21296.2
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	11.2	11.4	11.6	11.9	12.1	11.9	12.1	247.6	329.8
PB 2021 Total	960.9	360.8	440.3	410.0	548.1	730.9	773.2	18213.0	22437.2
PB 2020 Total	1000.2	368.6	236.3	179.4	197.1	207.0	227.9	24469.3	26885.8
Delta	-39.3	-7.8	204.0	230.6	351.0	523.9	545.3	-6256.3	-4448.6

Quantity Summary FY 2021 President's Budget / December 2019 SAR (TY$ M)										
Quantity	Undistributed	Prior	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	To Complete	Total
Development	3	0	0	0	0	0	0	0	0	3
Production	0	11	8	13	13	17	21	24	432	539
PB 2021 Total	3	11	8	13	13	17	21	24	432	542
PB 2020 Total	3	15	9	6	6	6	6	6	485	542
Delta	0	-4	-1	7	7	11	15	18	-53	0

Cost and Funding

Annual Funding By Appropriation

Annual Funding 2040 | RDT&E | Research, Development, Test, and Evaluation, Army							
		TY $M					
Fiscal Year	Quantity	End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2015	--	--	--	--	--	--	35.2
2016	--	--	--	--	--	--	38.3
2017	--	--	--	--	--	--	88.3
2018	--	--	--	--	--	--	194.6
2019	--	--	--	--	--	--	157.8
2020	--	--	--	--	--	--	174.4
2021	--	--	--	--	--	--	49.2
2022	--	--	--	--	--	--	32.6
2023	--	--	--	--	--	--	34.8
2024	--	--	--	--	--	--	5.3
2025	--	--	--	--	--	--	0.7
Subtotal	3	--	--	--	--	--	811.2

Annual Funding 2040 | RDT&E | Research, Development, Test, and Evaluation, Army							
Fiscal Year	Quantity	BY 2017 $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2015	--	--	--	--	--	--	35.2
2016	--	--	--	--	--	--	38.0
2017	--	--	--	--	--	--	85.8
2018	--	--	--	--	--	--	185.9
2019	--	--	--	--	--	--	148.5
2020	--	--	--	--	--	--	160.6
2021	--	--	--	--	--	--	44.5
2022	--	--	--	--	--	--	28.9
2023	--	--	--	--	--	--	30.3
2024	--	--	--	--	--	--	4.5
2025	--	--	--	--	--	--	0.6
Subtotal	3	--	--	--	--	--	762.8

Annual Funding 2031 | Procurement | Aircraft Procurement, Army							
Fiscal Year	Quantity	TY $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2015	--	--	--	102.2	102.2	--	102.2
2016	--	--	--	43.7	43.7	--	43.7
2017	--	8.7	10.6	33.2	52.5	--	52.5
2018	4	84.1	--	4.5	88.6	--	88.6
2019	7	139.5	--	9.0	148.5	--	148.5
2020	8	167.1	--	7.9	175.0	--	175.0
2021	13	305.7	11.3	62.1	379.1	0.4	379.5
2022	13	327.8	15.3	22.0	365.1	0.4	365.5
2023	17	469.2	24.5	0.3	494.0	7.2	501.2
2024	21	601.9	33.7	55.1	690.7	23.0	713.7
2025	24	687.1	47.2	--	734.3	26.1	760.4
2026	24	702.9	51.5	0.1	754.5	54.3	808.8
2027	23	739.5	58.1	--	797.6	65.9	863.5
2028	24	814.1	63.9	--	878.0	52.6	930.6
2029	24	819.1	64.4	--	883.5	53.2	936.7
2030	24	835.3	66.5	--	901.8	62.2	964.0
2031	24	851.1	66.9	--	918.0	39.4	957.4
2032	24	866.9	69.1	--	936.0	26.4	962.4
2033	24	878.5	69.4	--	947.9	27.9	975.8
2034	24	895.8	71.6	--	967.4	23.6	991.0
2035	24	913.9	72.2	--	986.1	14.1	1000.2
2036	24	929.4	74.4	--	1003.8	14.9	1018.7
2037	24	946.5	74.9	--	1021.4	16.8	1038.2
2038	24	962.3	77.3	--	1039.6	18.1	1057.7
2039	24	979.6	74.2	--	1053.8	19.5	1073.3
2040	24	1000.6	71.9	--	1072.5	20.2	1092.7
2041	24	1022.7	66.3	--	1089.0	21.0	1110.0
2042	24	1052.0	66.5	--	1118.5	22.6	1141.1
2043	25	955.9	63.1	--	1019.0	24.3	1043.3
Subtotal	539	18957.2	1364.8	340.1	20662.1	634.1	21296.2

Annual Funding 2031 | Procurement | Aircraft Procurement, Army							
Fiscal Year	Quantity	BY 2017 $M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2015	--	--	--	101.9	101.9	--	101.9
2016	--	--	--	43.0	43.0	--	43.0
2017	--	8.4	10.2	32.0	50.6	--	50.6
2018	4	79.5	--	4.3	83.8	--	83.8
2019	7	129.1	--	8.3	137.4	--	137.4
2020	8	151.6	--	7.2	158.8	--	158.8
2021	13	272.1	10.1	55.2	337.4	0.4	337.8
2022	13	286.1	13.4	19.2	318.7	0.3	319.0
2023	17	401.5	20.8	0.3	422.6	6.2	428.8
2024	21	504.9	28.3	46.2	579.4	19.3	598.7
2025	24	565.1	38.8	--	603.9	21.5	625.4
2026	24	566.7	41.5	0.1	608.3	43.8	652.1
2027	23	584.6	45.9	--	630.5	52.1	682.6
2028	24	630.9	49.5	--	680.4	40.8	721.2
2029	24	622.3	49.0	--	671.3	40.4	711.7
2030	24	622.2	49.6	--	671.8	46.3	718.1
2031	24	621.5	49.0	--	670.5	28.7	699.2
2032	24	620.7	49.4	--	670.1	18.9	689.0
2033	24	616.6	48.7	--	665.3	19.6	684.9
2034	24	616.5	49.3	--	665.8	16.2	682.0
2035	24	616.6	48.7	--	665.3	9.5	674.8
2036	24	614.7	49.3	--	664.0	9.8	673.8
2037	24	613.8	48.5	--	662.3	10.9	673.2
2038	24	611.8	49.1	--	660.9	11.5	672.4
2039	24	610.6	46.3	--	656.9	12.1	669.0
2040	24	611.4	44.0	--	655.4	12.3	667.7
2041	24	612.7	39.7	--	652.4	12.6	665.0
2042	24	617.9	39.0	--	656.9	13.3	670.2
2043	25	550.4	36.4	--	586.8	14.0	600.8
Subtotal	539	13360.2	954.5	317.7	14632.4	460.5	15092.9

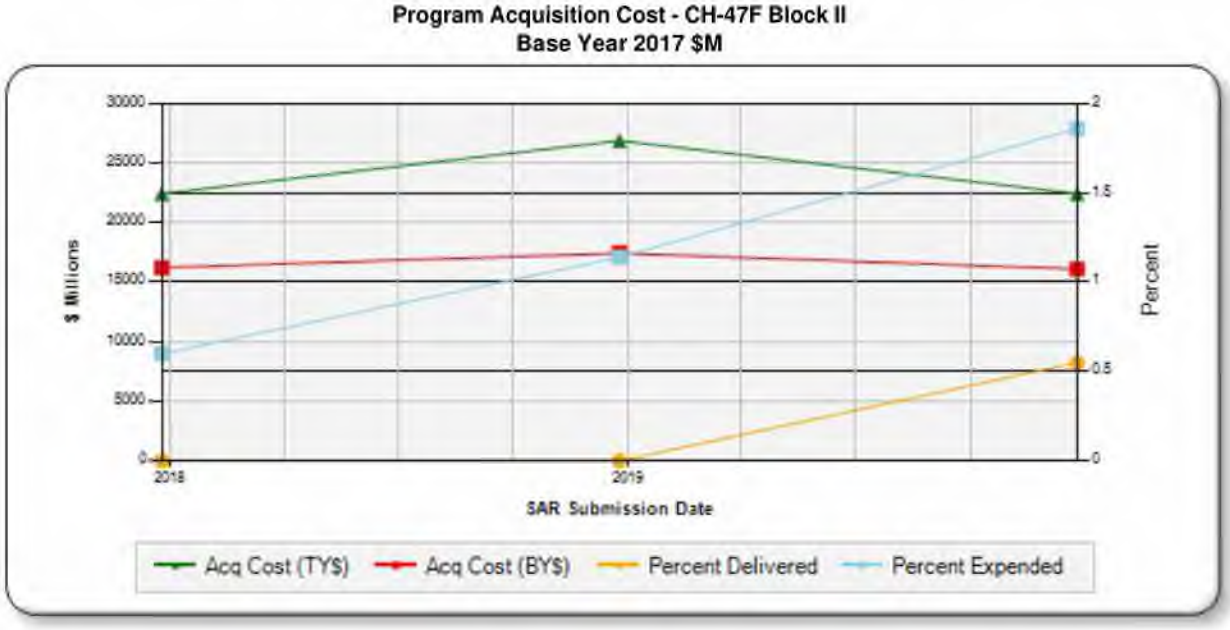
Cost Quantity Information 2031 | Procurement | Aircraft Procurement, Army		
Fiscal Year	**Quantity**	**End Item Recurring Flyaway (Aligned With Quantity) BY 2017 $M**
2015	--	--
2016	--	--
2017	--	--
2018	4	68.8
2019	7	126.8
2020	8	132.7
2021	13	273.6
2022	13	274.3
2023	17	388.7
2024	21	495.2
2025	24	568.2
2026	24	568.1
2027	23	582.2
2028	24	634.1
2029	24	625.4
2030	24	625.3
2031	24	624.6
2032	24	625.5
2033	24	619.6
2034	24	619.4
2035	24	620.0
2036	24	617.9
2037	24	617.1
2038	24	611.2
2039	24	621.2
2040	24	614.2
2041	24	615.5
2042	24	613.3
2043	25	577.3
Subtotal	539	13360.2

Annual Funding 2020 | Acq O&M | Operation and Maintenance, Army	
Fiscal Year	TY $M Total Program
2019	11.2
2020	11.4
2021	11.6
2022	11.9
2023	12.1
2024	11.9
2025	12.1
2026	12.4
2027	12.6
2028	12.9
2029	13.1
2030	13.4
2031	13.7
2032	13.9
2033	14.2
2034	14.5
2035	14.8
2036	15.1
2037	15.4
2038	15.7
2039	16.0
2040	16.3
2041	16.6
2042	17.0
Subtotal	329.8

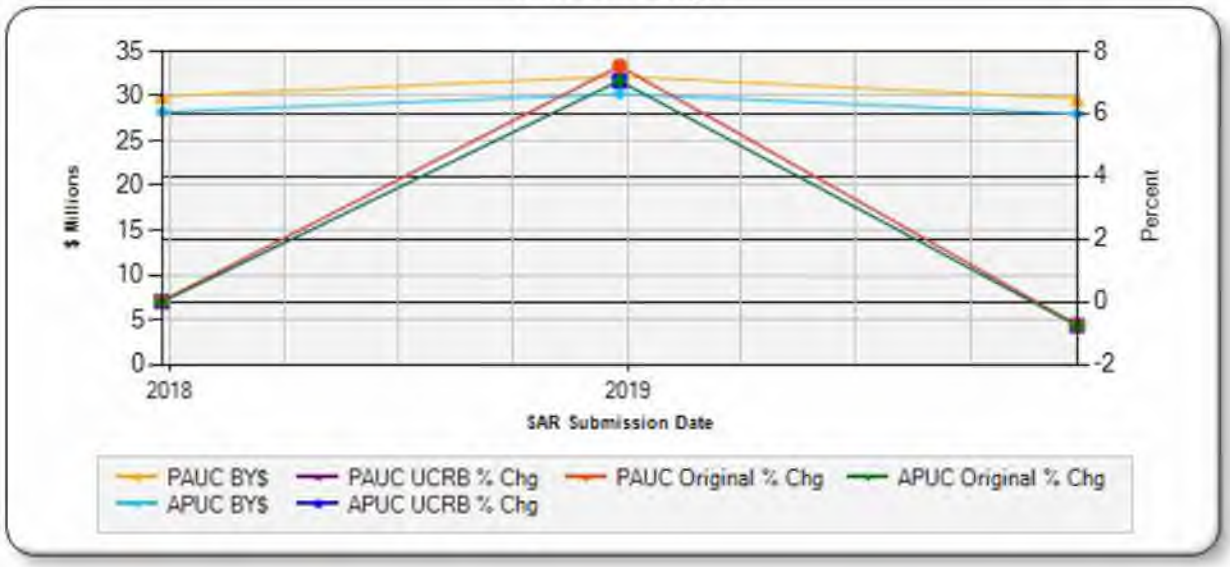
Annual Funding 2020 | Acq O&M | Operation and Maintenance, Army	
Fiscal Year	BY 2017 $M
	Total Program
2019	10.6
2020	10.6
2021	10.5
2022	10.6
2023	10.6
2024	10.2
2025	10.1
2026	10.2
2027	10.2
2028	10.2
2029	10.1
2030	10.2
2031	10.2
2032	10.1
2033	10.2
2034	10.2
2035	10.2
2036	10.2
2037	10.2
2038	10.2
2039	10.2
2040	10.2
2041	10.1
2042	10.2
Subtotal	246.3

Charts

CH-47F Block II first began SAR reporting in December 2017



Unit Cost - CH-47F Block II
Base Year 2017 $M



Risks

Significant Schedule and Technical Risks

Significant Schedule and Technical Risks	
Milestone B (July 2017)	
1.	If the Block II aircraft weight is higher than expected, then there may be a potential risk to mission performance. Mitigation: Monitor aircraft weight growth, incentivize weight reduction in contract, review load and fatigue assumptions and pursue weight reduction initiatives.
2.	If H-47 industrial base is not kept in operation, then cost for H-47 production and support will increase. Mitigation: Use Indefinite Delivery Indefinite Quantity contract to sustain production line, support Technology Applications Program Office production and encourage Foreign Military Sales.
3.	If all the individual contracts and engineering change proposals (ECPs) forming the subsystem development efforts are not synchronized with EMD, then there will be schedule delays. Mitigation: Manage all individual efforts to Block II Master schedule, and monitor progress to identify potential problems ahead of time.
4.	If the fuel cell test asset design and back up structure are insufficiently compatible with the Block II structure, then the fuel cell may not self-seal. Mitigation: Design and build a backup structure representative of a Block II airframe.
5.	If appropriate data rights are not acquired by the program, then the Project Manager will not be able to execute the strategy outlined in the Life-Cycle Sustainment Plan. Mitigation: Conduct detailed negotiations for rights in EMD and ECP contracts, and enforce Government rights through the configuration management process.
Current Estimate (December 2019)	
1.	If the Block II aircraft weight is higher than expected, then there may be a potential risk to mission performance. Mitigation: Monitor aircraft weight growth, incentivize weight reduction in contract, review load and fatigue assumptions and pursue weight reduction initiatives.
2.	If H-47 industrial base is not kept in operation, then cost for H-47 production and support will increase. Mitigation: Use Indefinite Delivery Indefinite Quantity contract to sustain production line, support Technology Applications Program Office production and encourage Foreign Military Sales.
3.	The FY 2018 - 2020 DoD Appropriations Acts reduced RDT&E funding by $66.7M. This limits the ability to react to component or flight test deficiencies. Mitigation: Defer funding of non-time critical activities. Defer emerging component qualification and flight test activities to the post MS C time frame.

Risks

Risk and Sensitivity Analysis

Risks and Sensitivity Analysis	
Current Baseline Estimate (February 2018)	
1.	The Current Baseline Estimate is based on the February 10, 2020 Program Office Estimate.
Original Baseline Estimate (February 2018)	
1.	The CH-47F Block II Original Baseline established by the Army Acquisition Executive on February 01, 2018. The SCP estimated the prototype and procurement costs using actuals from the CH-47F production program with adjustments to components modified. The most significant cost drivers in the CH-47F Block II estimate are labor hours and the Advanced Chinook Rotor Blade.
Revised Original Estimate (N/A)	
None	
Current Procurement Cost (December 2019)	
1.	The Current Procurement Cost uses the February 10, 2020 Program Office Estimate.

Low Rate Initial Production

There is no LRIP for this program.

Foreign Military Sales

None

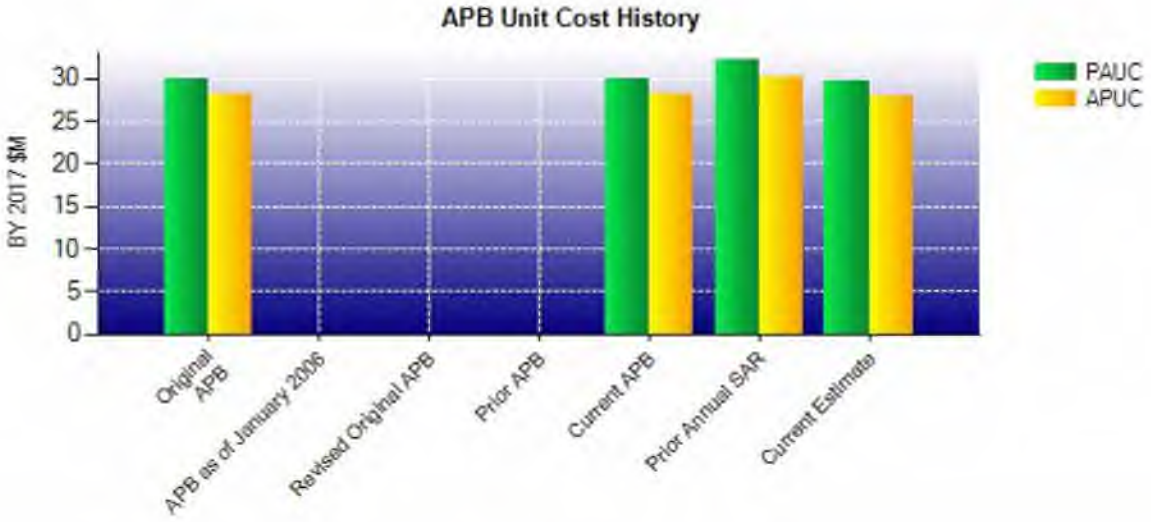
Nuclear Costs

None

Unit Cost

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 $M Current UCR Baseline (Feb 2018 APB)	BY 2017 $M Current Estimate (Dec 2019 SAR)	% Change
Program Acquisition Unit Cost			
Cost	16219.8	16102.0	
Quantity	542	542	
Unit Cost	29.926	29.708	-0.73
Average Procurement Unit Cost			
Cost	15208.8	15092.9	
Quantity	539	539	
Unit Cost	28.217	28.002	-0.76

Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Item	BY 2017 $M Original UCR Baseline (Feb 2018 APB)	BY 2017 $M Current Estimate (Dec 2019 SAR)	% Change
Program Acquisition Unit Cost			
Cost	16219.8	16102.0	
Quantity	542	542	
Unit Cost	29.926	29.708	-0.73
Average Procurement Unit Cost			
Cost	15208.8	15092.9	
Quantity	539	539	
Unit Cost	28.217	28.002	-0.76



APB Unit Cost History					
Item	Date	BY 2017 $M		TY $M	
		PAUC	APUC	PAUC	APUC
Original APB	Feb 2018	29.926	28.217	41.640	39.750
APB as of January 2006	N/A	N/A	N/A	N/A	N/A
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	N/A	N/A	N/A	N/A	N/A
Current APB	Feb 2018	29.926	28.217	41.640	39.750
Prior Annual SAR	Dec 2018	32.176	30.206	49.605	47.301
Current Estimate	Dec 2019	29.708	28.002	41.397	39.511

SAR Unit Cost History

Current SAR Baseline to Current Estimate (TY $M)									
PAUC Development Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
41.640	0.057	0.000	1.270	0.063	-1.623	0.000	-0.010	-0.243	41.397

Current SAR Baseline to Current Estimate (TY $M)									
Initial APUC Development Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
39.750	0.059	0.000	0.969	0.063	-1.321	0.000	-0.010	-0.240	39.511

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone A	N/A	N/A	N/A	N/A
Milestone B	N/A	Jul 2017	N/A	Jul 2017
Milestone C	N/A	Aug 2021	N/A	Aug 2021
IOC	N/A	Nov 2024	N/A	Nov 2024
Total Cost (TY $M)	N/A	22568.7	N/A	22437.2
Total Quantity	N/A	542	N/A	542
PAUC	N/A	41.640	N/A	41.397

Cost Variance

Summary TY $M					
Item	RDT&E	Procurement	MILCON	Acq O&M	Total
SAR Baseline (Development Estimate)	815.8	21425.2	--	327.7	22568.7
Previous Changes					
Economic	+0.3	+78.6	--	+1.1	+80.0
Quantity	--	--	--	--	--
Schedule	+179.8	+2826.6	--	+116.5	+3122.9
Engineering	--	+33.9	--	--	+33.9
Estimating	-53.6	+943.2	--	+2.7	+892.3
Other	--	--	--	--	--
Support	--	+188.0	--	--	+188.0
Subtotal	+126.5	+4070.3	--	+120.3	+4317.1
Current Changes					
Economic	-1.4	-46.9	--	-1.0	-49.3
Quantity	--	--	--	--	--
Schedule	-130.2	-2304.1	--	--	-2434.3
Engineering	--	--	--	--	--
Estimating	+0.5	-1655.0	--	-117.2	-1771.7
Other	--	--	--	--	--
Support	--	-193.3	--	--	-193.3
Subtotal	-131.1	-4199.3	--	-118.2	-4448.6
Total Changes	-4.6	-129.0	--	+2.1	-131.5
Current Estimate	811.2	21296.2	--	329.8	22437.2

Summary BY 2017 $M					
Item	RDT&E	Procurement	MILCON	Acq O&M	Total
SAR Baseline (Development Estimate)	766.2	15208.8	--	244.8	16219.8
Previous Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	+133.5	+346.2	--	+62.1	+541.8
Engineering	--	+31.7	--	--	+31.7
Estimating	-51.0	+628.6	--	+2.4	+580.0
Other	--	--	--	--	--
Support	--	+66.0	--	--	+66.0
Subtotal	+82.5	+1072.5	--	+64.5	+1219.5
Current Changes					
Economic	--	--	--	--	--
Quantity	--	--	--	--	--
Schedule	-86.4	--	--	--	-86.4
Engineering	--	--	--	--	--
Estimating	+0.5	-1118.7	--	-63.0	-1181.2
Other	--	--	--	--	--
Support	--	-69.7	--	--	-69.7
Subtotal	-85.9	-1188.4	--	-63.0	-1337.3
Total Changes	-3.4	-115.9	--	+1.5	-117.8
Current Estimate	762.8	15092.9	--	246.3	16102.0

Previous Estimate: December 2018

RDT&E	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-1.4
The 2018 SAR reported schedule and cost breaches prematurely, which are being corrected with this submission. Schedule revised to adjust the completion of the EMD phase from FY 2032 to FY 2025. (Schedule)	-86.4	-130.2
Adjustment for current and prior escalation. (Estimating)	+0.5	+0.5
RDT&E Subtotal	-85.9	-131.1

Procurement	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-46.9
The 2018 SAR reported schedule and cost breaches prematurely, which are being corrected with this submission. End of procurement schedule has been adjusted from FY 2049 to FY 2042. (Schedule)	0.0	-2304.1
The 2018 SAR reported schedule and cost breaches prematurely, which are being corrected with this submission. Estimate is adjusted to reverse impact of below economic rate of production penalty and seven additional years of Systems Engineering/Program Management. (Estimating)	-1119.2	-1655.5
Adjustment for current and prior escalation. (Estimating)	+0.5	+0.5
Decrease in Initial Spares for cost of hardware. (Support)	-1.0	-10.4
Decrease in Other Support for cost of hardware. (Support)	-68.7	-182.9
Procurement Subtotal	-1188.4	-4199.3

Acq O&M	$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-1.0
The 2018 SAR reported schedule and cost breaches prematurely, which are being corrected with this submission. Estimate revised to adjust the end of the acquisition program from FY 2049 to FY 2042. (Estimating)	-63.1	-117.3
Adjustment for current and prior escalation. (Estimating)	+0.1	+0.1
Acq O&M Subtotal	-63.0	-118.2

Contracts

Contract Identification

Appropriation: RDT&E
Contract Name: EMD
Contractor: The Boeing Company
Contractor Location: Route 291 & Stewart Ave.
Ridley Park, PA 19078-1099
Contract Number: W58RGZ-17-C-0059
Contract Type: Cost Plus Incentive Fee (CPIF)
Award Date: July 27, 2017
Definitization Date: July 27, 2017

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
269.5	N/A	N/A	275.4	N/A	4	275.4	275.4

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to minor modifications.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/16/2019)	+3.7	-2.4
Previous Cumulative Variances	+3.8	-0.9
Net Change	-0.1	-1.5

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to minor fluctuation in cost.

The unfavorable net change in the schedule variance is due to late delivery of the Advanced Chinook Rotor Blade and its impact on the EMD test schedule. But it is not impacting the APB schedule objectives.

Contract Identification

Appropriation: RDT&E
Contract Name: Improved Drive Train Phase II
Contractor: The Boeing Company
Contractor Location: Route 291 & Stewart Ave
Ridley Park, PA 19078-1099
Contract Number: W58RGZ-14-D-0075/8
Contract Type: Cost Plus Fixed Fee (CPFF)
Award Date: November 20, 2015
Definitization Date: November 20, 2015

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
51.5	N/A	0	51.5	N/A	0	47.1	47.1

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (12/16/2019)	-1.4	-4.2
Previous Cumulative Variances	-3.4	-4.3
Net Change	+2.0	+0.1

Cost and Schedule Variance Explanations

The favorable net change in the cost variance is due to efficient execution of qualification testing.

The favorable net change in the schedule variance is due to minor fluctuations in schedule.

Notes

The Initial Contract Price has been corrected from $49.1M to $51.5M.

Contract Identification

Appropriation: RDT&E
Contract Name: Electrical Avionics Structural Integration (EASI)
Contractor: The Boeing Company
Contractor Location: Route 291 & Stewart Ave
Ridley Park, PA 19078-1099
Contract Number: W58RGZ-14-D-0075/26
Contract Type: Cost Plus Fixed Fee (CPFF)
Award Date: November 20, 2015
Definitization Date: November 20, 2015

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
44.8	N/A	0	46.9	N/A	0	46.9	46.9

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to miscellaneous scope changes.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (2/12/2019)	+1.4	0.0
Previous Cumulative Variances	+1.4	0.0
Net Change	+0.0	+0.0

Cost and Schedule Variance Explanations

None

Notes

EVM reporting ceased due to contract completetion.

This contract is more than 90% complete; therefore, this is the final report for this contract.

Contract Identification

Appropriation: RDT&E
Contract Name: ACRB NRE
Contractor: The Boeing Company
Contractor Location: Route 291 & Stewart Ave
Ridley Park, PA 19078-1099
Contract Number: W58RGZ-14-D-0075/42
Contract Type: Cost Plus Fixed Fee (CPFF)
Award Date: April 15, 2016
Definitization Date: April 15, 2016

Contract Price							
Initial Contract Price ($M)			Current Contract Price ($M)			Estimated Price At Completion ($M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
51.3	N/A	0	68.4	N/A	0	68.4	68.4

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to developmental changes required to meet performance and test apparatus challenges encountered during qualification testing.

Contract Variance		
Item	Cost Variance	Schedule Variance
Cumulative Variances To Date (1/19/2020)	-0.1	-1.5
Previous Cumulative Variances	+0.7	-1.6
Net Change	-0.8	+0.1

Cost and Schedule Variance Explanations

The unfavorable net change in the cost variance is due to developmental changes required to meet performance and test apparatus challenges encountered during qualification testing.

The favorable net change in the schedule variance is due to delivery of prototype blades.

Notes

This contract was previously reported with the erroneous contract number W58RGZ-14-D-0014.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	3	3	3	100.00%
Production	0	0	539	0.00%
Total Program Quantity Delivered	3	3	542	0.55%

Expended and Appropriated (TY $M)			
Total Acquisition Cost	22437.2	Years Appropriated	6
Expended to Date	416.7	Percent Years Appropriated	20.69%
Percent Expended	1.86%	Appropriated to Date	1321.7
Total Funding Years	29	Percent Appropriated	5.89%

The above data is current as of February 10, 2020.

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	February 10, 2020
Source of Estimate:	POE
Quantity to Sustain:	470
Unit of Measure:	Aircraft
Service Life per Unit:	25.00 Years
Fiscal Years in Service:	FY 2023 - FY 2069

The costs are taken from the Febuary 2020 POE. It assumes an end state of 470 CH-47F Block II aircraft when fully fielded with an Operational tempo (OPTEMPO) of 174 peacetime flying hours per operational aircraft. While the common production costs of 69 MH-47Gs are included in the Procurement costs, they are excluded from the O&S costs as they are managed by Special Operations Aviation Regiment. The remaining aircraft are three RDT&E-funded aircraft that incur no O&S costs.

Sustainment Strategy

The CH-47F Block II weapon system follows the standard Army maintenance program, which is broken down into two levels of maintenance: Field and Sustainment. Field maintenance is performed by Combat Aviation Brigade personnel assigned to flight companies, aviation maintenance companies and aviation support companies. Sustainment maintenance is divided and primarily performed by three separate entities: the Original Equipment Manufacturers (OEM) and contractor field service representatives; Army depots located at fixed bases in the continental United States; and by the national maintenance sources of repair.

CH-47F Block II costs are based on CH-47F actual extracted from the O&S Management Information System (OSMIS). To calculate the CH-47F Block II costs, the CH-47F costs were adjusted by a factor to account for the increased reliability of modified parts.

Antecedent Information

The antecedent to the CH-47F Block II is the CH-47F, for which O&S costs are from the CH-47F SAR. The total O&S cost is based on 449 operational aircraft with a service life of 20 years peacetime OPTEMPO from FY 2007 through FY 2040. The reported CH-47F costs match the December 2017 CH-47F SAR, revised to BY 2017 dollars.

Annual O&S Costs BY2017 $M		
Cost Element	**CH-47F Block II Average Annual Cost Per Aircraft**	**CH-47F (Antecedent) Average Annual Cost Per Aircraft**
Unit-Level Manpower	0.516	0.496
Unit Operations	0.250	0.085
Maintenance	0.749	1.430
Sustaining Support	0.010	0.023
Continuing System Improvements	0.214	0.256
Indirect Support	0.111	0.122
Other	0.000	0.000
Total	1.850	2.412

Item	Total O&S Cost $M			
	CH-47F Block II			CH-47F (Antecedent)
	Current Development APB Objective/Threshold		Current Estimate	
Base Year	21737.0	23910.7	21737.0	21668.1
Then Year	40118.6	N/A	39060.6	N/A

Equation to Translate Annual Cost to Total Cost

Total cost = Average annual cost per aircraft x quantity x service life = $1.850M * 470 * 25

O&S Cost Variance		
Category	**BY 2017 $M**	**Change Explanations**
Prior SAR Total O&S Estimates - Dec 2018 SAR	21805.2	
Programmatic/Planning Factors	0.0	
Cost Estimating Methodology	-68.2	Decreased estimate for Post Production Modifications due to decreased procurement cost of aircraft. Revised escalation indices.
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	0.0	
Other	0.0	
Total Changes	-68.2	
Current Estimate	21737.0	

Disposal Estimate Details

Date of Estimate: February 10, 2020
Source of Estimate: POE
Disposal/Demilitarization Total Cost (BY 2017 $M): 298.9