Selected Acquisition Report (SAR)

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

FY 2024 President's Budget

Defense Acquisition Visibility Environment (DAVE)

Table of Contents

Common Acronyms and Abbreviations

$B - Billions of Dollars
$K - Thousands of Dollars
$M - Millions of Dollars
ACAT - Acquisition Category
Acq O&M - Acquisition-Related Operations and Maintenance
ADM - Acquisition Decision Memorandum
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
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
FMS - Foreign Military Sales
FOC - Full Operational Capability
FRP - Full Rate Production
FY - Fiscal Year
FYDP - Future Years Defense Program
ICE - Independent Cost Estimate
Inc - Increment
IOC - Initial Operational Capability
JROC - Joint Requirements Oversight Council
KPP - Key Performance Parameter
LRIP - Low Rate Initial Production
MDA - Milestone Decision Authority
MDAP - Major Defense Acquisition Program
MILCON - Military Construction
N/A - Not Applicable
O&M - Operations and Maintenance
O&S - Operating and Support
ORD - Operational Requirements Document
OSD - Office of the Secretary of Defense
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
U.S. - United States
UCR - Unit Cost Reporting
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

Program Information

Program Name

CH-47F Modernized Cargo Helicopter

DoD Component

Army

Responsible Office

Program Manager

Name: COL Al Niles, JR

Phone: 256-313=4252

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Mission and Description

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Executive Summary

CH-47F Block II

Program Highlights Since Last Report

The CH-47F Block II program requirements are stable and the program provides the most affordable path to maintaining the H-47 Chinook fleet's relevance until a Heavy variant decision is determined. Research, Development, Test, & Evaluation (RDT&E) funds are adequate to fully qualify the Block II system with legacy Fiberglass Rotor Blades (FRB). Aircraft Procurement Army (APA) funds are adequate to fund congressionally directed procurements. Recent FY 2022 APA appropriation is sufficient to procure two additional aircraft and fund logistics non-recurring, spares, publications and training support for CH-47F Block II FY 2021/FY 2022 procurement (Lot 1/Lot 2). Continued production for future aircraft procurements is contingent on receipt of additional procurement funding. The program risk is stable/unchanged since the 2021 Selected Acquisition Report (SAR). The CH-47F Block II program requirements are stable and Research, Development, Test, & Evaluation funds are adequate to fully qualify the Block II system with legacy FRB. Aircraft Procurement Appropriations funding is not adequate to procure the validated Army Acquisition Objective defined quantities. Recommendation is to certify the 2022 SAR with risk. Inducted four CH-47F Block I aircraft for Block II production on March 15, 2022. Successfully completed the Engineering and Manufacturing Development (EMD) Ground Flight and Test Plan at Boeing Mesa on April 14, 2022. Successfully completed the EMD Mission Performance test flights and analyzing Key Performance Parameters (KPPs) at Redstone Test Center, Redstone Arsenal on June 9, 2022. Awarded FY 2022 Advance Procurement contract to support FY 2023 Congressional Add on September 28, 2022. Awarded CH-47F Block II FY 2022 (Lot 2) contract for two aircraft on September 30, 2022. Successfully completed Mission Performance Flights at Fort Carson to verify KPPs on October 6, 2022. 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
Sep - 2021	Awarded CH-47F Block II Lot 1 contract for four aircraft with FRB, to fulfill the FY 2021 Congressional mandate.
Jan - 2020	CH-47F Block II test aircraft arrived at Naval Air Station Patuxent River for Electromagnetic Environment Effects Testing and testing was initiated.
Nov - 2019	CH-47F Block II test aircraft completed first test flight with Advanced Chinook Rotor Blades representing the complete Block II baseline configuration.
Nov - 2018	The third Block II test aircraft was loaded onto the main assembly line at Boeing Philadelphia.
Aug - 2018	The second Block II test aircraft was loaded onto the main assembly line at Boeing Philadelphia.
Jun - 2018	First Block II test aircraft was loaded onto the main assembly line at Boeing Philadelphia.
Dec - 2017	System Critical Design Review was completed.
Jul - 2017	The Army Acquisition Executive Acquisition Decision Memorandum (ADM) approved Milestone B, authorizing the CH-47F Block II program to enter EMD and designating the CH-47F Block II as Acquisition Category (ACAT) IC.
Jul - 2017	The CH-47F Block II EMD contract was awarded to The Boeing Company.

Schedule

CH-47F Block II

Events	Milestone Baseline Objective	Current Baseline Objective/Threshold		Current Estimate/Actual	Deviation
PDR				May 2016	
Milestone B				Jul 2017	
CDR				Dec 2017	
Developmental Test					
Developmental Test-Start	Jul 2019	Jul 2019	Jan 2020	Jul 2019	
Developmental Test - Finish	May 2021	May 2021	Nov 2021	May 2023	Yes
Milestone C	Aug 2021	Aug 2021	Feb 2022	Aug 2023	Yes
IOT&E					
IOT&E - Start	Nov 2023	Nov 2023	May 2024	Nov 2023	Yes
IOT&E- Finish	Mar 2024	Mar 2024	Sep 2024	Mar 2026	Yes
Initial Operational Capability	Nov 2024	Nov 2024	May 2025	Nov 2026	Yes
Full Rate Production Contract Award	Dec 2024	Dec 2024	Jun 2025	Dec 2026	Yes

Notes

The FY 2022 RDT&E funding increase will enable the program to continue system level qualification, mitigate the technical risk, initiate Limited User Test, and continue Live Fire and Ballistic Testing. The revised estimate will be provided upon completion of a program rebaseline. A revised Acquisition Program Baseline (APB) reflecting these changes will be submitted at the next Milestone review.

Deviation Explanation

As a result of the delay to the Developmental Test - Finish, the subsequent milestones also have deviations: Milestone C from February 2022 to August 2023; IOT&E - Start from May 2024 to November 2025; IOT&E - Finish from September 2024 to March 2026; Initial Operational Capability from May 2025 to November 2026; and Full Rate Production Contract Award from June 2025 to December 2026.

Performance

CH-47F Block II

Performance Characteristics					
Milestone Baseline	Current Baseline Objective/Threshold		Demonstrated Performance	Current Estimate/Actual	Deviation
(KSA) Reliability: - Mean Time Between Essential Maintenance Actions (MTBEMA) (flt hrs)					
	3.5	3.3		3.5	
(KPP) Transport combat equipped troops: - Number of Troops					
	44	31	32	32	
(KPP)Transport combat equipped troops: - Range (NM)					
	150	100	100	100	
(KPP) - Self-deploy with 30 minute fuel reserve (NM)					
	1260	1056	1162	1162	
(KSA) Maintenance: - Total Maintenance Ratio (mmh/flt hr)					
	9.2	9.8		9.2	
(KPP) - Transport 16,000 lbs of internal/external cargo at 4K/95F with 30 minute reserve (NM)					
	100	50	50	50	

Requirement Reference

Validated:

ORD Revision 4 dated January 26, 2006

Deviation Explanation

No deviations for this program/subprogram

Notes

Self Deploy with 30 minute fuel reserve (NM) changed from 1260 to 1162; Transport 16,000 lbs of internal/external cargo at

4K/95F with 30 minute reserve (NM) from 50 to 50 NM (16,000 lbs); and Transport combat equipped troops-range (NM) changed from 150 to 100. The Current performance estimates reflect results of developmental test flights.

Acquisition Budget Estimate

CH-47F Block II

Total Acquisition Cost

		Milestone APB	Current Baseline		Budget Estimate PB 2024		
Category	**Base Year**	**Objective (BY$M)**	**Objective (BY$M)**	**Threshold (BY$M)**	**BY$M**	**TY$M**	**Deviation**
RDT&E	2017	766.2	766.2	842.8	760.2	811.2	
Procurement	2017	15,208.8	15,208.8	16,279.7	14,753.8	21,296.2	
MILCON	2017	0	0	0	0	0	
Acq. O&M	2017	244.8	244.8	269.3	34.2	34.2	
Total		16,219.8	16,219.8	17,391.8	15,548.2	22,141.6	
PAUC	2017	29.926	29.926	32.088	28.687	40.852	
APUC	2017	28.217	28.217	30.204	27.373	39.511	

Appropriation Category Deviation Explanations

PAUC Deviation Explanation

APUC Deviation Explanation

Budget Notes

A Program Deviation Report has been submitted. The revised estimate will be provided upon completion of a program re-baseline. A revised Acquisition Program Baseline reflecting these changes will be submitted at the next Milestone review.

Total End Item Quantity

Quantity Category	Current APB Quantity	Current Estimate Quantity
Development	3	3
Procurement	539	539
O&M-Acquired		

Quantity Notes

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 the Special Operations Aviation Regiment. The remaining aircraft are three RDT&E-funded aircraft that incur no O&S costs.

Unit Cost
CH-47F Block II

Current UCR Baseline and Current Estimate (Base-Year Dollars)			
Category ($M) Base Year:2017	**Current UCR Baseline**	**Current Estimate**	**% Change**
Program Acquisition Unit Cost			
Cost	16,219.8	15,548.2	
Quantity	542	542	
Unit Cost	29.926	28.687	-4.14%
Average Procurement Unit Cost			
Cost	15,208.8	14,753.8	
Quantity	539	539	
Unit Cost	28.217	27.373	-2.99%

Original UCR Baseline and Current Estimate (Base-Year Dollars)			
Category ($M) Base Year:2017	**Original UCR Baseline**	**Current Estimate**	**% Change**
Program Acquisition Unit Cost			
Cost	16,219.8	15,548.2	
Quantity	542	542	
Unit Cost	29.926	28.687	-4.14%
Average Procurement Unit Cost			
Cost	15,208.8	14,753.8	
Quantity	539	539	
Unit Cost	28.217	27.373	-2.99%

Cost Growth Details

Current Baseline PAUC Breach Explanation

Current Baseline APUC Breach Explanation

Original Baseline PAUC Breach Explanation

Original Baseline APUC Breach Explanation

Impacts of Schedule Changes on Unit Cost

Impacts of Performance Changes on Unit Cost

Actions Taken or Proposed to Control Future Cost Growth

Risk and Sensitivity Analysis

CH-47F Block II

Risk and Sensitivity Analysis
Current Procurement Cost(December - 2022)
As a result of the recent Army decision and schedule deviation, the program is preparing for a re-baseline to document and measure program change.
Original Baseline Estimate (February - 2018)
The Original Baseline Estimate was 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.
Current Baseline Estimate (February - 2018)
The Current Baseline Estimate is based on the February 10, 2020 Program Office Estimate.

Schedule Risk		
Current	December 31, 2022	If CH-47F Block II does not receive long term production funding, then program uncertainty impacts future planning. Mitigation: Army production decision no earlier than CY 2023.
Technical Risks		
Current	December 27, 2022	If CH-47F industrial base is not kept in operation, then costs for CH-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.
MS B	July 27, 2017	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.
MS B	July 27, 2017	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 Engineering and Manufacturing Development and Engineering Change Proposal contracts, and enforce Government rights through the configuration management process.
MS B	July 27, 2017	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.

MS B	July 27, 2017	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.
MS B	July 27, 2017	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.

Low Rate Initial Production

CH-47F Block II

Item	Initial LRIP Decision	Current Total LRIP
Approval Date		
Approved Quantity		
Reference		
Start Year		
End Year		

Rationale if quantity exceeds 10% of the total number of articles to be procured:

Notes

Milestone C has not been completed. Therefore LRIP information is unavailable.

Contracts & Efforts

Contract Data	
Contract Number	W58RGZ-14-D-0075
Effort Number	
Modification Number	P00023
Award Date	04/15/2016
Definitization Date	04/15/2016
Order Number	42
CAGE Code/CAGE Legal Name	77272/The Boeing Company
Contract Title	ACRB NRE
Contract Address	Ridley Park, PA
Contracting Office	ACC-Redstone
Supported Phase	Development
Contract Strategy	FAR 16.5 (IDIQ)
Contract Type	Cost-Plus-Fixed-Fee
Modification Date	June 17, 2021
Work Start Date	April 15, 2016
Technical Data Rights	Government Purpose License Rights to Technical Data--Noncommercial Items & Software
Work Completed	83.32%

Contracts/Effort Price, Quantity, and Performance (TY$M)		
Initial Target Price	Current Target Price	
$51.3	$64.8	
Initial Ceiling Price	Current Ceiling Price	
Contractor EAC	PM EAC	
$80	$80	
Initial Quantity	Current Quantity	Delivered Quantity
0	0	0
BAC	BCWP	ACWP

$75.6	$63	$66
BCWS	Cost Variance	Schedule Variance
$65.4	-$3	-$2.4

Contract Notes:

Contract close out is being worked based on the Army decision to remove the Advanced Chinook Rotor Blade (ACRB) from the CH-47F Block II configuration. This will be the final report.

Factors Contributing to Cost Variance and Projected Effects on Program Costs

The unfavorable cost variance is due to realization of technical risks.

Factors Contributing to Schedule Variance and Projected Effects on Program Schedule

The unfavorable schedule variance is due to realization of technical risks.

Contract Data	
Contract Number	W58RGZ-21-D-0098
Effort Number	
Modification Number	P00001
Award Date	09/30/2021
Definitization Date	09/30/2021
Order Number	
CAGE Code/CAGE Legal Name	77272/The Boeing Company
Contract Title	CH-47F Block II Renew Aircraft
Contract Address	Ridley Park, PA
Contracting Office	ACC-Redstone
Supported Phase	Development
Contract Strategy	FAR 16.5 (IDIQ)
Contract Type	Fixed-Price Incentive (Firm Target)
Modification Date	September 29, 2022
Work Start Date	September 30, 2021
Technical Data Rights	Government Purpose License Rights to Technical Data--Noncommercial Items & Software
Work Completed	15.79%

Contracts/Effort Price, Quantity, and Performance (TY$M)		
Initial Target Price	Current Target Price	
$136.4	$203.7	
Initial Ceiling Price	Current Ceiling Price	
Contractor EAC	PM EAC	
$187.7	$192.4	
Initial Quantity	Current Quantity	Delivered Quantity
4	6	0
BAC	BCWP	ACWP
$128.2	$20.2	$22.6
BCWS	Cost Variance	Schedule Variance

$21.8	-$2.3	-$1.5

Contract Notes:

This contract is for the FY 2021 and FY 2022 Congressional Mandated CH-47F Block II procurement (Lots 1 and 2). Integrated Program Management Report (IPMR) reporting of Lot 2 has not begun.

Factors Contributing to Cost Variance and Projected Effects on Program Costs

The unfavorable cost variance is due to overruns in labor for initial assemblies; however, Boeing management has provided path forward to mitigate future overruns.

Factors Contributing to Schedule Variance and Projected Effects on Program Schedule

The unfavorable schedule variance is due to delays in material delivery; however, material delays are not forecasted to adversely impact the build schedule.

Contract Data	
Contract Number	W58RGZ-17-C-0059
Effort Number	
Modification Number	P00069
Award Date	07/27/2017
Definitization Date	07/27/2017
Order Number	
CAGE Code/CAGE Legal Name	77272/The Boeing Company
Contract Title	Engineering and Manufacturing Development
Contract Address	Ridley Park, PA
Contracting Office	ACC-Redstone
Supported Phase	Development
Contract Strategy	FAR 15 (Negotiated)
Contract Type	Cost-Plus-Incentive-Fee
Modification Date	July 25, 2022
Work Start Date	July 27, 2017
Technical Data Rights	Government Purpose License Rights to Technical Data--Noncommercial Items & Software
Work Completed	95.39%

Contracts/Effort Price, Quantity, and Performance (TY$M)		
Initial Target Price	Current Target Price	
$269.5	$311.8	
Initial Ceiling Price	Current Ceiling Price	
	$311.8	
Contractor EAC	PM EAC	
$289.2	$283.2	
Initial Quantity	Current Quantity	Delivered Quantity
3	3	3
BAC	BCWP	ACWP
$296.9	$283.2	$270.2

BCWS	Cost Variance	Schedule Variance
$284.3	$13.1	-$1.1

Contract Notes:

Contract is over 90% complete. This will be the last report.

Factors Contributing to Cost Variance and Projected Effects on Program Costs
The favorable cost variance has been experienced across the WBS. The Block II EMD program was heavily involved in flight test since the beginning of 2022 which reduced the support needed from individual engineering teams. Notably, the Airframe Components LOE (Level of Effort) control account required less support across structural engineering teams. Additional cost savings were realized by modifying existing Functional Test Procedures (FTP) from earlier Chinook programs and updating the documents with EMD-specific changes. Finally, increased efficiency was realized while executing the Block II Rotor Hub fatigue testing by applying lessons learned to the tear-down, evaluation, and build-up of the test fixture which reduced the direct labor requirements over time.

Factors Contributing to Schedule Variance and Projected Effects on Program Schedule
The unfavorable schedule variance is due to flight test interruptions for unexpected maintenance and troubleshooting of the Lightweight Fuel System (LFS). Troubleshooting on the LFS has been completed with hardware and material on hand to reassemble the flight test aircraft.

External Government Activities

Activity Title	Government Entity	Supported Phase

CAGE		Work Start Date	
City		State/Province:	
Notes			

Deliveries and Expenditures

CH-47F Block II

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

Expended and Appropriated (TY $M)

Years Appropriated to date: 9

Total Years Appropriated Funding (Current Baseline): 29

Percent Years Appropriated: 31.03%

Then-Year Funding Appropriated as Percentage of Total Acquisition Estimate: 17.32%

Then-Year Funding Expended as Percentage of Total Acquisition Estimate: 13.74%

Total Acquisition Cost: 22,141.6

Deliveries & Expenditures Notes:

Operating and Support Costs

CH-47F Block II

O&S Cost Breakdown:

Category (BY$ Million)	CH-47F Block II / Materiel Availability
Unit-Level Manpower	6,063.0
Unit Operations	2,937.5
Maintenance	8,800.8
Sustaining Support	117.5
Continued System Improvements	2,514.3
Other	
Total	20,433.0

Cost Estimate Source: CH-47F Bock II Milestone B Army Cost Position, approved May 2017.

O&S Cost Notes:

The CH-47F Block II estimate assumes an end state of 465 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. The antecedent to the CH-47F Block II is the CH-47F, for which O&S costs are from the CH-47F Operational Sustainment Review. The total O&S cost is based on 465 operational aircraft with a service life of 20 years peacetime.

Total Program O&S Cost Compared with Baseline					
	Current Baseline				
	Objective (BY$M)	Threshold (BY$M)	Current Estimate (BY$M)	Current Estimate (TY$M)	Deviation
Total O&S	21,737	23,910.7	21,737.0	39,060.6	

Note:

The CH-47F Block II estimate 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.

O&S Cost Deviation Explanation

Operating and Support Costs - Disposal and Unitized Costs

CH-47F Block II

Annual Unitized O&S Cost Definition and Calculation Relative to Total O&S Cost:

Annual Unitized O&S Cost Definition and Calculation Relative to Total O&S Cost:Average annual cost per aircraft = Total cost by category/ (quantity x service life)

Sustainment Factors	System Name: CH-47F Block II	Antecedent System Name: CH-47F
Quantity to Sustain	470	465
Unit of Measure	Aircraft	Aircraft
Unit Expected Service Life	25	20

Base Year: 2017

Annual Unitized O&S Cost by Category Base Year $ Unit:($M)	System Name: CH-47F Block II	Antecedent System Name: CH-47F
Unit-Level Manpower	0.5	0.9
Unit Operations	0.3	0.1
Maintenance	0.7	1.2
Sustaining Support	0.0	0.1
Continued System Improvements	0.2	0.1
Other		
Total O&S	1.7	2.4

Disposal/Demilitarization Cost Estimate

(Base Year $Millions)	System Name: CH-47F Block II	Antecedent System Name: CH-47F
Total Disposal	298.9	8.3

Cost Estimate Source - Disposal	
Type:	Other
Approval Authority and Date:	DASA-CE 03/11/2017
Note:	
Disposal Cost Notes:	
Additional O&S Estimate Assumptions:	

Sustainment Strategy:
The PM is preparing a CH-47F Block II Life Cycle Sustainment Plan (LCSP) in coordination with Army Material Command and Aviation and Missile Command, which will be approved as a separate document, to detail CH-47F Block II program sustainment. The overall strategy is to sustain CH-47F Block II aircraft using the current, two-level, organic support structure, to the maximum extent possible. In a manner similar to the current CH-47F fielding and support system, the aircraft will be sustained with Interim Contractor Support while moving towards either organic or Performance Based Logistics support structures. Program support and sustainment, using the detailed LCSP, will ensure the Block II system is operationally effective, suitable, and logistically supportable.
Antecedent Estimate Assumptions:
The antecedent to the CH-47F Block II is the CH-47F, for which O&S costs are from the CH-47F Operational Sustainment Review. The total O&S cost is based on 465 operational aircraft with a service life of 20 years peacetime.