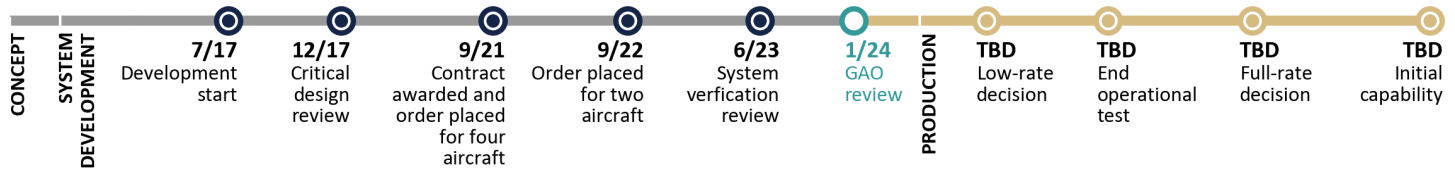




Source: U.S. Army. | GAO-24-106831

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

The Army’s CH-47F Block II program upgrades the CH-47F aircraft and is intended to provide additional capability, greater reach, and increased payload capacity. Improvements include a strengthened airframe and drive train, improved flight controls, and upgraded fuel and electrical systems to increase lift in all weather conditions. The Army expects the CH-47F Block II fuel and rotor system improvements to reduce operating and support costs. CH-47F helicopters provide the Army’s only heavy-lift capability and are scheduled to remain in service through 2060.



Program Performance fiscal year 2024 dollars in millions

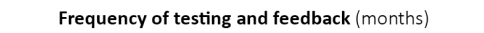
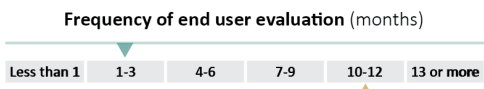
| | Total Acquisition Cost <small>dollars in millions</small> | | | Unit Cost <small>dollars in millions</small> | Quantities <small>number</small> | Cycle time <small>in months</small> |
|--|--|----------|----------|---|-------------------------------------|--|
| First Full Estimate <small>(2/2018)</small> | \$956 | \$18,978 | \$20,239 | \$37 | 542 | 88 |
| Reported in 2023 ^a <small>(7/2022)</small> | \$949 | \$18,410 | \$19,401 | \$36 | 542 | TBD |
| Current Estimate <small>(7/2023)</small> | \$949 | \$18,410 | \$19,401 | \$36 | 542 | TBD |

Legend: ■ Development cost □ Procurement cost ○ Percent change since 2023^a

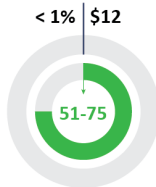
Total quantities comprise three development quantities and 539 procurement quantities, including 69 MH-47G Block II aircraft for Special Operations Forces. Program performance data may change because of the ongoing rebaselining effort, which the program expects to complete after the Army’s decision about the future of the program. The program did not report an initial capability date and, as a result, the cycle time could not be calculated. The graphic bars depict only research and development and procurement costs. However, total acquisition costs may also include costs for military construction as well as acquisition operation and maintenance.
^aGAO-23-106059.

Software Development as of January 2024

Approach: Agile, Iterative (other than Agile), and DevSecOps



Software percentage of total acquisition cost
(fiscal year 2024 dollars in millions)



Percentage of progress to meet current requirements

Program Essentials

Prime contractor: Boeing

Contract type: CPIF (development); FPI/IDIQ (production before low-rate production decision)

Attainment of Product Knowledge as of January 2024

| Resources and requirements match | Development Start | Current Status |
|--|-------------------|----------------|
| Demonstrate all critical technologies in a relevant environment | ● | ● |
| Demonstrate all critical technologies in a realistic environment | ○ | ● |
| Complete a system-level preliminary design review | ● | ● |
| Product design is stable | Design Review | |
| Release at least 90 percent of design drawings | ○ | ● |
| Test a system-level integrated prototype | ○ | ● |
| Manufacturing processes are mature | Production Start | |
| Demonstrate critical processes on a pilot production line | NA | NA |
| Test a production-representative prototype in its intended environment | NA | NA |

● Knowledge attained ○ Knowledge not attained ... Information not available NA - Not applicable

We did not assess CH-47F Block II manufacturing maturity because the program has yet to reach the production phase. The program stated that, in response to direction by congressional conferees, it contracted to procure Block II aircraft prior to the production decision.

CH-47F Block II Program

Technology Maturity and Design Stability

The CH-47F Block II program reported that its one critical technology is fully mature, but the program continues to face related uncertainties based on the industrial base and alternate suppliers. The technology relies on proprietary components provided by a single supplier. According to program documentation, the prime contractor has not conducted an industrial base capability assessment, which includes a study of supplier capacity and output to assess the supplier's production capability. The prime contractor identified an alternative supplier to use in case the original supplier cannot meet production needs. According to the program, the industrial base capability assessment can be conducted once a path forward decision has been made and low-rate initial production quantities are determined.

As we previously reported, the fuel system was redesigned as a result of test failures. The redesigned system passed the first phase of testing. The program plans to conduct more tests in the first quarter of fiscal year 2025 to confirm survivability.

Production Readiness

The time frame for the low-rate production decision, originally planned for the fourth quarter of fiscal year 2021, continues to slip. As we previously reported, the decision was delayed due to technical concerns found in testing as well as funding shortfalls. The program now anticipates a production decision approximately 18 months after the Army's path forward determination. Army officials stated in November 2023 that they anticipate this decision in the near-term. They added that multiple factors are being considered, including industrial base health and future fleet readiness and force structure.

According to the program, an advanced procurement order for long lead items for a third lot was placed in September 2022. Program officials stated that the number of Lot 3 aircraft will be determined during negotiations. As we previously reported, to maintain the production line, the Army reported placing orders with Boeing in 2021 and 2022 for six aircraft in total.

A production readiness review was conducted in support of the systems added after a congressionally mandated increase in program funding. The review stated that the program could produce quantities of less than seven per year but did not meet the criteria to support the larger quantities associated with low-rate production. The Army stated that the review identified manageable risks related to the requirements for the added systems and low-rate production.

The review recommended that an additional production readiness assessment be conducted prior to the low-rate

decision to ensure risks have been mitigated. Low-rate production would require ramping up to a production rate higher than seven aircraft per year and moving from a pilot production line to a main production line. According to the Army, Boeing's transition plan for Block II includes moving from the pilot line to the main production line for foreign military sales production, which it stated provides enough production volume (12 aircraft per year) to necessitate the move.

The review further noted risks related to tooling, staffing levels, and the supply chain. According to the program, the contractor has mitigation plans in place to address these risks. Even so, as the review noted, these issues could limit or delay production until the program addresses them.

Software and Cybersecurity

The program reported an increase in software costs due to changes necessary to support rotor blade, electrical system, and fuel system configuration changes. However, according to the Army, the CH-47 software is common and shared across the CH-47 fleet. The Army stated that, as a result of these shared costs, the software costs will not increase the CH-47F Block II program costs.

As we reported last year, cybersecurity continues to pose a medium risk to the program due to findings from vulnerability penetration testing conducted in 2021. The Army stated that the program is working with the contractor to implement mitigation plans.

Other Program Issues

The program office identified several consequences arising from ongoing production decision delays. For example, due to their age, many aircraft were identified to be upgraded to Block II capabilities after production start. If these Block II upgrades are further delayed, the Army will have to undertake a recapitalization program to ensure these aging aircraft continue to meet readiness requirements. According to officials, if the industrial base is not maintained, the program will lose suppliers and manufacturing knowledge and the program would face increased schedule delays and costs due to production stops and restarts.

Program Office Comments

We provided a draft of this assessment to the Army for review and comment. It provided technical comments, which we incorporated where appropriate. The Army stated that it is procuring three additional CH-47F Block II aircraft under Lot 3 with fiberglass rotor blades. It also stated that developmental testing was completed to validate key troop and cargo-carrying capabilities under operationally-relevant high and hot conditions. According to the Army, the program's path forward decision is pending formal approval and release.