United States Government Accountability Office

Report to Congressional Committees

June 2024

# NATIONAL SCIENCE FOUNDATION

# Five Major Facilities Projects Experienced Delays

Accessible Version

GAO-24-107044

# GAO Highlights

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Highlights of GAO-24-107044, a report to congressional committees
**JUNE 2024**

# NATIONAL SCIENCE FOUNDATION

## Five Major Facilities Projects Experienced Delays

### Why GAO Did This Study

NSF supports the design, construction, and operations of various research infrastructure projects, such as telescopes and research vessels. These projects include major facilities that cost over $100 million to construct and mid-scale projects that cost from $20 million to $100 million. NSF funds construction, acquisition, and commissioning of major facilities and mid-scale research infrastructure projects through its Major Research Equipment and Facilities Construction account.

As of March 2024, NSF has 18 research infrastructure projects in design, construction, or implementation that are either funded or proposed for funding from the major research facilities account. Building these projects on time and within budget helps support the scientific community's ability to conduct research and advance U.S. scientific goals.

The Consolidated Appropriations Act 2023 includes provisions for GAO to review projects funded from NSF's major research facilities account. This report, the seventh in a series, describes the cost and schedule performance of NSF's research infrastructure projects. To do this study, GAO reviewed NSF documents, examined NSF policies to manage and oversee projects, and interviewed NSF officials.

### What GAO Found

The National Science Foundation (NSF) continues to make progress on its major facilities projects in construction, major facilities projects in design, and mid-scale research infrastructure projects. However, NSF's project management data show schedule increases for all major facilities projects in construction relative to estimates from June 2023. NSF officials also anticipate additional increases in schedule for both the Rubin Observatory and Antarctic Infrastructure Modernization for Science (AIMS), but estimates will not be available until NSF completes a Rubin Observatory supplemental funding request in late Spring 2024 and an AIMS construction review in July 2024. Additionally, NSF completed the re-baseline for both Large Hadron Collider High Luminosity Upgrade projects in August 2023, which formalized the cost and schedule increases that resulted from prior events, such as the pandemic.

**Examples of National Science Foundation Major Facilities Projects**


The Rubin Observatory (left), a Regional Class Research Vessel (middle), and the Antarctic Infrastructure Modernization for Science's Vehicle Equipment and Operations Center (right).

Source: Rubin Obs/NSF/AURA (B. Stalder, left); National Science Foundation (middle); National Science Foundation (right). | GAO-24-107044

Both the Regional Class Research Vessels (RCRV) and AIMS have reported staffing shortages, each with unique causes, that are resulting in ongoing construction delays. NSF officials said that a lack of skilled labor is affecting the RCRV project at the shipyard in Louisiana. Workforce recovery after Hurricane Ida has been hindered by scarce housing, and reconstruction remains a challenge. In contrast, NSF officials said the shortage of skilled labor for the AIMS project, based in Antarctica, is due to U.S. demand for construction workers and heavy equipment operators. The lower availability of domestic labor has increased reliance on non-American workers, and the process for obtaining background checks for these workers is causing delays. The contractor is working with its primary subcontractor to develop a mitigation plan to hire and onboard the necessary staff.

For the major facilities projects in design, two of the five progressed through their respective design phases and are nearing entry into the construction stage. A third project recently entered the design stage, and two other projects are awaiting NSF decisions to advance to later design phases. Finally, NSF has progressed on the implementation of the eight previously awarded mid-scale projects.

# Contents

**Abbreviations**

| | |
|---|---|
| AIMS | Antarctic Infrastructure Modernization for Science |
| ARV | Antarctic Research Vessel |
| ATLAS | A Toroidal Large Hadron Collider Apparatus |
| CMS | Compact Muon Solenoid |
| ELT | U.S. Extremely Large Telescope Program |
| LHC | Large Hadron Collider |
| MREFC | Major Research Equipment and Facilities Construction |
| ngVLA | Next-Generation Very Large Array |
| NSF | National Science Foundation |
| RCRV | Regional Class Research Vessels |
| Rubin | Vera C. Rubin Observatory |

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
441 G St. N.W.
Washington, DC 20548

June 12, 2024

The Honorable Jeanne Shaheen
Chair
The Honorable Jerry Moran
Ranking Member
Subcommittee on Commerce, Justice, Science, and Related Agencies
Committee on Appropriations
United States Senate

The Honorable Hal Rogers
Chair
The Honorable Matt Cartwright
Ranking Member
Subcommittee on Commerce, Justice, Science, and Related Agencies
Committee on Appropriations
House of Representatives

The National Science Foundation (NSF) supports the design, construction, and operations of various research infrastructure projects, such as telescopes and research vessels. NSF funds construction, acquisition, and commissioning through its Major Research Equipment and Facilities Construction (MREFC) account. In addition to major facilities projects, NSF expanded its MREFC portfolio in 2020 by awarding some mid-scale research infrastructure projects from that budget account.[1] Together, these research infrastructure projects are designed and constructed to meet the needs of the scientific community and further scientific and engineering research capabilities. NSF uses cooperative agreements and contracts to fund and oversee the projects throughout their life cycles, including the design, construction, and operations stages. For fiscal year 2024, the NSF MREFC account received an appropriation of $234 million; NSF requested $300 million in fiscal year 2025.

[1]NSF manages another set of mid-scale projects with total project costs under $20 million that are not funded from the MREFC account.

The Consolidated Appropriations Act 2023 includes provisions for GAO to review projects within NSF's MREFC account.[2] In December 2023, we reported that NSF had finalized cost and schedule increases for all five major facilities projects in construction. These increases were caused by the pandemic and other factors. We also reported that NSF's Antarctic Infrastructure Modernization for Science (AIMS) project only met three of the four characteristics of a reliable cost estimate. Therefore, we recommended that NSF take steps to ensure the project meets the well-documented characteristic of a reliable cost estimate. NSF officials said that the agency is working to address this recommendation.

This report, the seventh in the series, provides the cost and schedule performance updates reported by NSF for the 9-month period from June 1, 2023, to March 1, 2024, the most recent and complete data available. We reviewed NSF project progress reports and other available documentation that describes cost and schedule performance for the major facilities projects and mid-scale research infrastructure projects that were under construction or in design at the time of our review. We also interviewed NSF officials about the projects. For a detailed description of our scope and methodology, see appendix I.

We conducted this performance audit from September 2023 to June 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

# Background

## Current MREFC Projects

As of March 2024, NSF has 18 research infrastructure projects in design, construction, or implementation that are either funded or proposed for

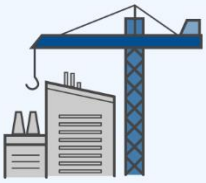
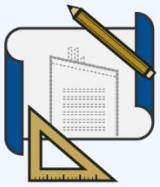
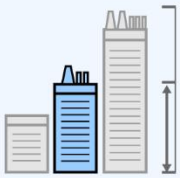
[2]The mandate is contained within the explanatory statement printed at 168 Cong. Rec. S7819, referenced by the Consolidated Appropriations Act, 2023, Pub. L. No. 117-328, § 4, 136 Stat. 4459, 4462 (2022).

funding from the MREFC account (see fig. 1).[3] Of these 18 projects, five are major facilities projects in the construction stage, five are major facilities projects in the design stage, and eight are mid-scale projects in implementation. Major facilities projects each have a total project cost of more than $100 million, while mid-scale projects funded from the MREFC account each have a total project cost from $20 million to $100 million.[4]

[3]According to NSF officials, mid-scale research infrastructure projects are classified as "in implementation" rather than "in construction" given their wide range in technical nature.

[4]NSF also funds the Antarctic Recapitalization Program—a portfolio of investments in facilities and infrastructure across U.S. Antarctic Program—through the MREFC Account, according to officials. In June 2022, NSF completed a re-baseline of the project to reflect the reduced scope of the AIMS project which now funds only two of the original six components. NSF officials added that the previously unfunded portions of AIMS will be considered within the broader the Antarctic Recapitalization Program and may transition to stand-alone mid-scale research infrastructure projects in the future. We reported on the planned restructuring of the AIMS project in July 2022, see GAO, *National Science Foundation: Continued Cost and Schedule Increases for Major Facilities Projects in Construction*. GAO-22-105550. (Washington, D.C.: July 20, 2022).

**Figure 1: NSF's Major and Mid-Scale Research Infrastructure Projects, as of March 2024**

| Major facilities projects in construction | Major facilities projects in design | Mid-Scale research infrastructure projects |
|---|---|---|
|  |  |  |
| • Vera C. Rubin Observatory<br>• Regional Class Research Vessels<br>• Antarctic Infrastructure Modernization for Science<br>• Large Hadron Collider High Luminosity Upgrade Program<br>  ○ ATLAS Detector<br>  ○ CMS Detector | • Leadership Class Computing Facility<br>• Antarctic Research Vessel<br>• U.S. Extremely Large Telescope Program<br>  ○ Thirty Meter Telescope<br>  ○ Giant Magellan Telescope<br>• Next-Generation Very Large Array | • Advanced Millimeter Survey Instrumentation in Chile<br>• Airborne Phased Array Radar<br>• Compact X-Ray Free-Electron Laser<br>• Distributed Energy Resources Connect<br>• Global Ocean Biogeochemistry Array<br>• High Magnetic Field Beamline<br>• Network for Advanced Nuclear Magnetic Resonance Spectroscopy<br>• Research Data Ecosystem |

Source: GAO analysis of National Science Foundation (NSF) information. | GAO-24-107044

ATLAS = A Toroidal Large Hadron Collider Apparatus; CMS = Compact Muon Solenoid

## Stages in the Life Cycles of NSF's Research Infrastructure Projects

Each research infrastructure project has a sponsoring organization from within NSF's eight research directorates. For major facilities projects, the sponsoring organization assesses the scientific merit of a potential project, proposes a project for funding through NSF's MREFC account, and is responsible for overseeing the project during the five stages of its life cycle, described below. The mid-scale projects are proposed by the research community in response to a program solicitation. NSF funding for the development, design, operations, and divestment generally comes from the Research and Related Activities account via the sponsoring

directorate. Funding for the construction stage generally comes from the MREFC account.

- **Development.** Initial project ideas emerge. A broad consensus is built within the relevant scientific community on the potential long-term needs, priorities, and general requirements for research infrastructure that NSF may consider funding.
- **Design.** Entrance into this stage occurs when the NSF Director approves the proposed research infrastructure as a national priority and the sponsoring directorate makes an award (either through a cooperative agreement or contract) for developing detailed project scope, cost, and schedule for possible construction.[5] This stage is divided into conceptual, preliminary, and final design phases. A project exits the design stage and enters the construction stage after a successful review by the NSF director and other key stakeholders of its project execution plan and authorization of its not-to-exceed total project cost by the National Science Board.
- **Construction.** The construction stage begins when NSF makes award to external awardees to acquire or construct research infrastructure. The construction stage ends after final delivery and acceptance of the facility as defined in the scope of work and facility performance per terms of the award instrument. Because of the broader technical nature of mid-scale projects and different NSF oversight processes, NSF labels some mid-scale projects as in implementation rather than in the construction stage.
- **Operations.** The operations stage includes the day-to-day work necessary to operate and maintain the research infrastructure (including refurbishment or upgrade activities) and to support research.
- **Divestment.** Divestment involves the transfer of the research infrastructure to another entity's operational and financial control or the decommissioning of the research infrastructure, including its complete deconstruction and removal. NSF generally decides to divest of research infrastructure when the agency or the scientific community determines that the facility is no longer considered a

[5]Awards generally take the form of cooperative agreements, although NSF occasionally uses contracts, according to agency officials.

priority to advance science, according to NSF's Research Infrastructure Guide.[6]

# Most Projects Remain on Schedule and within Budget; Five Projects in Construction Experienced Delays

NSF continues to make progress with its major facilities projects in construction, major facilities projects in design, and mid-scale research infrastructure projects funded from the MREFC account. All five major facilities projects in construction have reported schedule increases relative to their June 2023 estimates, and additional delays are expected but not finalized for two of these five. Two major facilities projects in design progressed through their respective design phases, while an additional project was added to the design stage and two other projects are awaiting NSF decisions to advance to later design phases. Finally, NSF has progressed on the implementation of the eight previously awarded mid-scale projects.

## All Five Major Facilities Projects in Construction Experienced Delays

All five major facilities projects in construction experienced delays to construction completion. NSF's project management data show schedule increases relative to their estimates from June 2023 for the Rubin Observatory (Rubin), Regional Class Research Vessels (RCRV), Antarctic Infrastructure Modernization for Science (AIMS), and both Large Hadron Collider (LHC) High Luminosity Upgrade projects: the ATLAS (A Toroidal LHC Apparatus) and CMS (Compact Muon Solenoid) detectors.[7] NSF officials anticipate additional increases in schedule for both Rubin and AIMS, although estimates will not be available until NSF completes

[6]According to officials, NSF expects the 2025 revision of the Research Infrastructure Guide will rename the divestment stage as disposition, to better capture the options available to NSF.

[7]We have calculated changes to project cost and schedule using the Earned Value Management System. According to NSF's Research Infrastructure Guide, the progress of all major facilities projects during the construction stage is tracked and measured using this system.

and approves the Rubin supplemental funding request in late Spring 2024 and the AIMS construction review in July 2024.

NSF completed the re-baseline for ATLAS and CMS in August 2023, which formalized increases in the authorized total project cost that resulted from prior events, such as the pandemic. The new authorized cost for ATLAS is $82.8 million, representing a $7.8 million increase, and the new authorized cost for CMS is $88 million, representing a $10 million increase. In addition, NSF officials anticipate a $15 million increase in the estimated total project cost to Rubin that will be finalized supplemental funding request in late Spring 2024. This will increase the estimated total project cost to approximately $565 million, which is below the $571 million currently authorized. Cost and schedule are inextricably linked; therefore, the schedule delays experienced across all five major projects may result in increased costs in the future.

Table 1 provides an overview of the reported status of each major facilities project in construction, as of March 2024.

**Table 1: Status of NSF Major Research Infrastructure Facilities Projects in Construction, as of March 2024**

| Project name | NSF-authorized total project cost[a] | Cost change since June 2023 | Expected construction completion date[b] | Schedule change since June 2023 |
|---|---|---|---|---|
| Rubin Observatory | $571.0 million | No change[c] | March 2025 | (cost or schedule increase) 3 months[c] |
| Regional Class Research Vessels | $400.0 million | No change | January 2027 | (cost or schedule increase) 7 months |
| Antarctic Infrastructure Modernization for Science | $275.0 million[d] | No change[e] | January 2027 | (cost or schedule increase) 1 month[e] |
| Large Hadron Collider High Luminosity Upgrade Program | $82.8 million | (cost or schedule increase) $7.8 million | July 2028 | (cost or schedule increase) 11 months |
| ATLAS detector | $88.0 million | (cost or schedule increase) $10.0 million | July 2028 | (cost or schedule increase) 1 month |
| CMS detector | | | | |
| **Total** | **$1,416.8 million** | | | |

Legend: ATLAS = A Toroidal Large Hadron Collider Apparatus; CMS = Compact Muon Solenoid; ▲ = cost or schedule increase

Source: GAO analysis of National Science Foundation (NSF) information | GAO-24-107044

[a]Total project cost is determined by the NSF authorized not-to-exceed cost. This value is not the same as the current estimated total project cost based on NSF's Earned Value Management System calculations. The total project cost does not include design costs, which generally do not come from the Major Research Equipment and Facilities Construction (MREFC) account.

[b]Expected construction completion is determined by adding the remaining schedule contingency to the current forecasted construction completion date based on NSF's Earned Value Management System calculations in comparison to the performance measurement baseline.

[c]NSF officials will update cost and schedule estimates for the Rubin Observatory once it approves a supplemental funding request, currently estimated at $15 million and scheduled for late Spring 2024.

[d]Total project cost for the Antarctic Infrastructure Modernization for Science project is determined by current estimated total project cost based on NSF's Earned Value Management System calculations. During NSF's re-baselining to account for delays due to the pandemic, the NSF authorized total project cost was not changed from $410.4 million. Therefore, the current estimated total project cost better reflects the current cost status.

[e]NSF officials will update cost and schedule estimates for the Antarctic Infrastructure Modernization for Science at its construction review in July 2024.

There are a variety of factors contributing to the anticipated schedule increases for RCRV and AIMS, which may also result in cost increases. Specifically, both RCRV and AIMS have reported staffing shortages, each with unique causes, that are resulting in ongoing construction delays. NSF officials said that a shortage of skilled labor is an issue for the entire shipbuilding industry, particularly in Louisiana, home of the RCRV shipyard. For example, workforce recovery after Hurricane Ida has been further hindered by scarce housing, and reconstruction remains an ongoing challenge. In contrast, NSF officials said the shortage of skilled labor for the AIMS project is due to domestic U.S. demand for construction workers and heavy equipment operators. The lower availability of domestic labor has increased reliance on non-American workers, and the process for obtaining background checks for these workers is taking longer than the expected four-week period. The contractor is working with its primary subcontractor to develop a mitigation plan to hire and onboard the necessary staff.

Table 2 highlights significant, recent events that may cause cost or schedule increases for these projects.

**Table 2: Significant Events Occurring from June 2023 to March 2024 that May Affect Cost or Schedule for Major Facilities Projects in Construction**

| Project name | Significant events |
|---|---|
| Regional Class Research Vessels | • Shipyard missed the delivery date of September 22, 2023, for Vessel 1, and the awardee is withholding financial penalties in accordance with the shipyard contract.<br>• Further delays in delivery for all three vessels are anticipated due to staffing shortages with shipyard employees, subcontractors, and vendors.<br>• The awardee's project team expects additional delays due to the complexity of Vessel 1 and internal space constraints. |
| Rubin Observatory | • A vacuum leak—now resolved—caused a multi-month delay in the shipment of the camera.<br>• A malfunctioning dome crane, now repaired, caused delays in installing and testing the dome and telescope mount. |

| Project name | Significant events |
|---|---|
| Antarctic Infrastructure Modernization for Science | • Year-long delays are anticipated for Vehicle Equipment and Operations Center and the Lodging Facility due to construction errors and availability of materials.<br>• Three of four cranes were out of service at McMurdo in early November 2023 delaying work on Vehicle Equipment and Operations Center and Lodging Facility.<br>• Inability to enclose the Lodging Facility and the lack of planned winter staff has delayed construction work. |

Source: GAO analysis of National Science Foundation (NSF) information | GAO-24-107044

In the following pages, we provide one-page overviews for each major facilities project in construction.

Vera C. Rubin Observatory 1 pager

RCRV 1 pager

AIMS 1 pager

Large Hadron Collider High Luminosity Upgrade Program: ATLAS (A Toroidal LHC Apparatus) Project 1 pager

Large Hadron Collider High Luminosity Upgrade Program: CMS (Compact Muon Solenoid) Project 1 pager

## Projects in Design Continued with One New Approved Project and Two Pending NSF's Decision to Advance

Since June 2023, two major facilities projects in design progressed through their respective design phases. In addition, two other projects are awaiting NSF decisions to advance to later design phases and a fifth project recently entered the design stage. Specifically:

- The NSF Director approved the advancement of the Antarctic Research Vessel to the final design phase.
- NSF will advance the Leadership Class Computing Facility to the construction stage pending Office of Management and Budget and congressional approval of its fiscal year 2024 spending plan.
- In response to a recommendation from the National Science Board, NSF plans to evaluate whether to advance either of the originally proposed Extremely Large Telescope projects to the Final Design Phase.

- NSF approved one new project into the design stage: the Next-generation Very Large Array.

In the following pages, we provide one-page overviews for each major facilities project in design.

Antarctic Research Vessel One-Pager

Leadership Class Computing Facility One Pager

U.S. Extremely Large Telescope Program One Pager

Next-Generation Very Large Array One Pager

## Mid-Scale Projects Continued with Minor Adjustments for Two Projects

NSF has made progress with implementing the eight previously awarded mid-scale research infrastructure projects. Table 3 provides an overview of the status of all eight projects as of March 2024. All authorized award amounts remain unchanged since our last report in December 2023. According to NSF, two projects, the Advanced Millimeter Survey Instrumentation in Chile and the High Magnetic Field Beamline, extended their scheduled completion dates— by four months to August 2028 and by two months to December 2025, respectively. According to NSF officials, the schedule extension to the High Magnetic Field Beamline was caused by availability of materials and labor. In contrast, the adjustment to the scheduled completion date for the Advanced Millimeter Survey Instrumentation in Chile was due to a delayed start from the proposed date and not because of any going implementation challenges. Additionally, the Research Data Ecosystem project is currently undergoing re-planning due to inflation and personnel costs. NSF officials told us that cost and schedule changes will likely be available within the next 12 months.

**Table 3: Status of NSF Mid-Scale Infrastructure Projects, as of March 2024**

| Project name | Awardee | Current total project cost | Scheduled completion date |
|---|---|---|---|
| Advanced Millimeter Survey Instrumentation in Chile | The Trustees of the University of Pennsylvania | $52.7 million | August 2028 (schedule increase) |
| Airborne Phased Array Radar | University Corporation for Atmospheric Research | $91.8 million | May 2028 |

| Project name | Awardee | Current total project cost | Scheduled completion date |
|---|---|---|---|
| Compact X-Ray Free-Electron Laser | Arizona State University | $90.8 million | February 2028 |
| Distributed Energy Resources Connect | University of California, San Diego | $42.0 million[a] | October 2025 |
| Global Ocean Biogeochemistry Array | Monterey Bay Aquarium Research Institute | $52.9 million | October 2025 |
| High Magnetic Field Beamline | Cornell University | $32.7 million | December 2025 (schedule increase) |
| Network for Advanced Nuclear Magnetic Resonance Spectroscopy | University of Connecticut Health Center | $39.7 million | June 2025 |
| Research Data Ecosystem | University of Michigan | $38.4 million | January 2027 |

Legend: ▲ = schedule increase

Source: GAO analysis of National Science Foundation (NSF) information | GAO-24-107044

[a]In addition to the $42.0 million in MREFC funds, the Distributed Energy Resources Connect project received a $2.5 million supplement from funding provided to NSF in the American Rescue Plan Act of 2021.

# Agency Comments

We provided a draft of this report to NSF for review and comment. NSF provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Director of the National Science Foundation, and other interested parties. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-6888 or WrightC@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs May be found on the last page of this report. GAO staff who made key contributions to this report are listed in Appendix II.

Candice N. Wright
Director
Science, Technology Assessment, and Analytics

# Appendix I: Objectives, Scope, and Methodology

This report describes the cost and schedule performance of the National Science Foundation (NSF) for its ongoing major facilities and mid-scale research infrastructure projects.

To describe the cost and schedule performance of NSF's major facilities projects, we reviewed agency project progress reports for project updates dated from June 1, 2023, to January 31, 2024. To collect the most up-to-date information, we supplemented progress report data with a questionnaire to NSF to update project status, cost, and schedule as of March 1, 2024.

To describe the status of NSF's mid-scale research infrastructure projects funded by the Major Research Equipment and Facilities Construction (MREFC) account, we also reviewed an agency dashboard that detailed project cost and schedule and recent project milestones that were updated as of March 1, 2024.

We further supported our evidence collection with interviews with NSF officials about major projects which were in design or construction. In addition, we reviewed project risk reports and risk registers, documentation on available scope reduction options, and other NSF documents.

We conducted this performance audit from September 2023 to June 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

# Appendix II: GAO Contact and Staff Acknowledgments

## GAO Contact:

Candice N. Wright, (202) 512-6888 or WrightC@gao.gov

## Staff Acknowledgments:

In addition to the contact named above, Sarah Harvey (Assistant Director), Timothy Kinoshita (Analyst in Charge), and Darren Grant made key contributions to this report. Also contributing were Michael Armes, John Bauckman, Louise Fickel, Patrick Harner, Gina Hoover, William Laing, Jason T. Lee, David Marroni, and Curtis Martin.

# Related GAO Products

*National Science Foundation: Revised Policies on Developing Costs and Schedules Could Improve Estimates for Large Facilities.* GAO-18-370. Washington, D.C.: June 1, 2018.

*National Science Foundation: Cost and Schedule Performance of Large Facilities Construction Projects and Opportunities to Improve Project Management.* GAO-19-227. Washington, D.C.: March 27, 2019.

*National Science Foundation: Cost and Schedule Performance of Major Facilities Construction Projects and Progress on Prior GAO Recommendations.* GAO-20-268. Washington, D.C.: April 3, 2020.

*National Science Foundation: COVID-19 Affected Ongoing Construction of Major Facilities Projects.* GAO-21-417. Washington, D.C.: June 8, 2021.

*National Science Foundation: Continued Cost and Schedule Increases for Major Facilities Projects in Construction.* GAO-22-105550. Washington, D.C.: July 20, 2022.

*National Science Foundation: Additional Steps Would Improve Cost Estimate for Antarctic Research Infrastructure Project.* GAO-24-106380. Washington, D.C.: December 5, 2023.

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