

**MAJOR RESEARCH EQUIPMENT  
AND FACILITIES CONSTRUCTION (MREFC)**

**\$94,650,000  
-\$128,130,000 / -57.5%**

**Major Research Equipment and Facilities Construction Funding**

(Dollars in Millions)

	FY 2017 Actual	FY 2018 Request	FY 2019 Request	Change Over	
				FY 2017 Actual Amount	Percent
Major Research Equipment and Facilities Construction	\$222.78	\$182.80	\$94.65	-\$128.13	-57.5%

The MREFC account supports the acquisition, construction, and commissioning of major research infrastructure that provides unique capabilities at the frontiers of science and engineering. Initial planning, design, and post-construction operations and maintenance are funded through the R&RA account.

**MREFC Account Funding, by Project**

(Dollars in Millions)

	FY 2017 Actual	FY 2018 Request	FY 2019 Request	FY 2020 Estimate	FY 2021 Estimate	FY 2022 Estimate	FY 2023 Estimate	FY 2024 Estimate
DKIST	\$18.30	\$20.00	\$16.13	-	-	-	-	-
LSST	60.18	57.80	48.82	46.34	40.75	5.36	-	-
NEON	22.10	-	-	-	-	-	-	-
RCRV	121.88	105.00	28.70	-	-	-	-	-
Enhanced Oversight	0.33	-	1.00	1.00	1.00	1.00	1.00	1.00
<b>Total</b>	<b>\$222.78</b>	<b>\$182.80</b>	<b>\$94.65</b>	<b>\$47.34</b>	<b>\$41.75</b>	<b>\$6.36</b>	<b>\$1.00</b>	<b>\$1.00</b>

Modern and effective research infrastructure is critical to maintaining U.S. international leadership in science and engineering. The future success of entire fields of research depends upon access to new generations of powerful research tools. Increasingly, these tools are large and complex and have a significant information technology or cyber-infrastructure component. To be considered for MREFC funding, NSF requires that a project represent an exceptional opportunity to enable research and education. The project should be transformative in nature, with the potential to shift the paradigm in scientific understanding. The projects included in this budget request meet these criteria based on NSF and National Science Board review and approval.

In FY 2019, NSF requests \$94.65 million to continue construction of three ongoing projects: Daniel K. Inouye Solar Telescope (DKIST), Large Synoptic Survey Telescope (LSST), and Regional Class Research Research Vessels (RCRV). For more information on each project, including the disposition of construction support for the National Ecological Observatory Network (NEON), see the individual narratives later in this chapter.

Since FY 2009, projects funded through the MREFC account have been subject to NSF's "no cost overrun" policy. As a result, NSF processes and procedures must assure the development of realistic and well-supported total project cost estimates for major research infrastructure such that approved budgets are sufficient to accomplish the scientific objectives. The current policy as published in NSF's Large Facilities Manual (LFM) requires that: (1) the total project cost estimate when exiting the preliminary design phase includes adequate contingency to cover foreseeable risks; (2) any cost increases not covered by contingency be accommodated first by reductions in scope, provided that the actual enacted funding levels have been consistent with the established annual cash flow requirements; and (3) if the project is approved to continue

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and further scope reductions become too detrimental to science, then the first 10 percent of any cost increase must be covered by the sponsoring directorate through R&RA funding. This final step was required for NEON, as described in the individual narrative for the project.

All projects funded through the MREFC account undergo periodic cost, schedule, and risk reviews as required by the LFM and the terms and conditions of the cooperative agreements. NSF policies and reporting requirements are designed to ensure routine and reliable tracking of progress (including the use of Earned Value Management), project spending, and use of contingency, and that program and recipients each have sufficient oversight and management authority (respectively) to meet project objectives.

**Enhanced NSF Oversight**

NSF has greatly strengthened its oversight of major facility projects in recent years, with a number of those enhancements now codified in the American Innovation and Competitiveness Act (AICA) of 2017. One significant enhancement is holding a portion of budget contingency (up to 100 percent) and only allocating to the program for obligation to the project based on demonstrated need. This oversight mechanism will generally result in some MREFC carryover each year; however, future obligation is anticipated to manage project risks.

Enhanced oversight of the construction stage now also includes mandatory incurred cost audits and independent cost estimates, as well as other audits and reviews based on NSF’s annual major facility portfolio risk assessment. These efforts are conducted by NSF and are generally not attributable to a specific project at the time of budget formulation, nor are they part of the total project cost developed and managed by the recipient. To properly support and transparently account for these efforts, actual costs and future estimates for Enhanced Oversight are shown separately from projects in the MREFC account table. In FY 2017 and FY 2018, these activities are supported with funds recovered from projects completed in previous years.

**Appropriations Language**

For necessary expenses for the acquisition, construction, commissioning, and upgrading of major research equipment, facilities, and other such capital assets pursuant to the National Science Foundation Act of 1950 (42 U.S.C. 1861 et seq.), including authorized travel, ~~\$182,800,000~~\$94,650,000 to remain available until expended.

*Note.—A full-year 2018 appropriation for this account was not enacted at the time the budget was prepared; therefore, the budget assumes this account is operating under the Continuing Appropriations Act, 2018 (Division D of P.L. 115–56, as amended). The amounts included for 2018 reflect the annualized level provided by the continuing resolution.*

**Major Research Equipment and Facilities Construction  
FY 2019 Summary Statement**  
(Dollars in Millions)

	Enacted/ Request	Unobligated Balance Available Start of Year	Unobligated Balance Available End of Year	Adjustments to Prior Year Accounts	Transfers	Obligations Actual/ Estimates
FY 2017 Appropriation	\$209.00	\$37.21	-\$31.36	\$2.07	\$5.86	\$222.78
FY 2018 Annualized CR	207.58	31.36				238.94
FY 2019 Request	94.65					94.65
\$ Change from FY 2018 Annualized CR						-\$144.29
% Change from FY 2018 Annualized CR						-60.4%

**Explanation of Carryover**

Within the Major Research Equipment and Facilities Construction account, \$31.36 million was carried over into FY 2018.

National Ecological Observatory Network (NEON)

- Amount: \$11.06 million
- Reason: Ongoing construction and budget contingency funding needed for project completion scheduled for FY 2018. For additional information, please see the NEON section of the MREFC Chapter.
- Obligation: Anticipated FY 2018 Quarter 4
  
- Amount: \$3.15 million
- Reason: Program funds reserved for unknown or unforeseen risks as identified by NSF.
- Obligation: TBD - Funds held in reserve unless required.

Large Synoptic Survey Telescope

- Amount: \$13.64 million
- Reason: Budget contingency funding not obligated in FY 2017.
- Obligation: Anticipated FY 2018 Quarter 4

Daniel K. Inouye Solar Telescope

- Amount: \$1.70 million
- Reason: Budget contingency funding not obligated in FY 2017.
- Obligation: Anticipated FY 2018 Quarter 4

The remaining \$1.81 million is from completed projects and ended tasks, most recently the Ocean Observatories Initiative and Large Hadron Collider. In FY 2018 NSF intends to use a portion of it for enhanced oversight of MREFC projects. For a further description of the enhanced oversight activities, see the MREFC chapter.

**The MREFC Account for FY 2019**

The following narratives present detailed information on NSF’s MREFC-funded construction projects with the sponsoring organization noted in parenthesis.

Daniel K. Inouye Solar Telescope (MPS).....	MREFC - 4
Large Synoptic Survey Telescope (MPS).....	MREFC - 10
National Ecological Observatory Network (BIO).....	MREFC - 15
Regional Class Research Vessels (GEO).....	MREFC - 21