

Science Laboratories Infrastructure

Overview

The Science Laboratories Infrastructure (SLI) program's mission is to support scientific and technological innovation at the Office of Science (SC) national laboratories by funding enabling infrastructure and fostering safe, efficient, reliable, resilient, and environmentally responsible operations. The SLI program's main priorities are improving SC's existing physical assets (including major utility systems), transitioning to carbon-free energy through electrification and energy efficiency upgrades, and providing new modern facilities that enable efficiency and collaboration for the evolving science mission. The SLI program funds line-item construction projects; General Plant Projects (GPP) (minor construction less than \$30 million); Payments in Lieu of Taxes (PILT) to local communities around the Argonne, Brookhaven, and Oak Ridge National Laboratories (ANL, BNL, and ORNL); Nuclear Operations at ORNL; landlord responsibilities across the Oak Ridge Reservation; and will support a Laboratory Operations Apprenticeship program that SC proposed in the FY 2024 Request.

SC manages an infrastructure portfolio worth nearly \$31.8 billion, across 10 national laboratories, with nearly 24 million gross square feet (gsf) of about 1,600 government-owned buildings and trailers. SC assets at the national laboratories include major research and user facilities, laboratory and office buildings, support facilities, and a vast network of utilities and other support facilities that form the backbone of each site. Delivering the SC mission requires significant stewardship of research facilities and the renovation and replacement of enabling infrastructure, including buildings and support infrastructure.

SC laboratories conduct annual assessments of the condition, utilization, and mission readiness of their buildings and support infrastructure. In FY 2022, the assessments rated 43 percent of the general-purpose buildings substandard or inadequate to meet mission needs. In addition, 71 percent of the utility systems were rated as substandard or inadequate while 35 percent of the remaining support infrastructure was rated as substandard or inadequate. The substandard and inadequate condition of facilities results in operational inefficiencies, reduced resiliency and reliability, unplanned outages, costly repairs, and elevated safety risks. In collaboration with SC programs and the laboratories, the SLI program plans and executes modernization and revitalization projects to manage risks and reduce the impacts of these deficiencies on the SC mission.

SC and the laboratories integrate the assessment results with scientific mission needs through the development of comprehensive Campus Strategies during the bi-annual laboratory planning process. To support current and future capabilities and infrastructure, each laboratory's Campus Strategy^a identifies activities and infrastructure investments, such as line-item construction and GPPs, as part of asset life-cycle management. SC leadership uses these Campus Strategies, and its own evaluation of infrastructure needs, to inform the SLI budget requests.

In FY 2023, SC invested nearly \$861 million in maintenance, repair, and construction to sustain and enhance its general-purpose infrastructure. These investments stemmed from a variety of funding sources, including Federal appropriations for line-item construction, GPPs, laboratory overhead funding of Institutional GPPs (IGPPs), and maintenance and repair activities. The SLI investments in line-item construction and GPPs provide the critical backbone of laboratory operations and are key elements of this overall investment strategy.

Highlights of the FY 2025 Request

The FY 2025 Request of \$ 295.2 million is an increase of \$ 14.5 million over the FY 2023 Enacted. The 2025 Request continues to focus on improving infrastructure across the SC national laboratory complex and supports eight ongoing construction projects:

1. Princeton Plasma Innovation Center at Princeton Plasma Physics Laboratory (PPPL);
2. Critical Infrastructure Recovery & Renewal at Princeton Plasma Physics Laboratory (PPPL);
3. Seismic and Safety Modernization project at Lawrence Berkeley National Laboratory (LBNL);
4. CEBAF Renovation and Expansion project at Thomas Jefferson National Accelerator Facility (TJNAF);
5. Argonne Utilities Upgrade project at Argonne National Laboratory (ANL);

^a <https://science.osti.gov/-/media/lp/pdf/laboratory-planning-process/FY-2022-ALPs-for-Web.pdf>

6. Linear Assets Modernization Project at Lawrence Berkeley National Laboratory (LBNL);
7. Critical Utilities Infrastructure Revitalization Project at SLAC National Accelerator Laboratory (SLAC); and
8. Utilities Infrastructure Project at Fermi National Accelerator Laboratory (FNAL).

These ongoing line-item projects will replace, upgrade, and improve utility systems and facilities to improve resilience, sustainability, carbon free electricity, and provide new laboratory space with the necessary performance capabilities to support SC's evolving mission.

SLI annually evaluates enabling infrastructure needs for all laboratories. The FY 2025 Request also includes funding for GPPs, which are an essential component of our infrastructure modernization portfolio. GPPs address urgent, targeted, and emerging, high risk enabling infrastructure and utility needs across SC laboratories and facilities such as building HVAC systems, chilled water plants, electrical systems components (switches/transformers), fire safety, emergency generators, site security improvements, office/laboratory modernization, etc. GPPs are the most expedient resource for avoiding unplanned and disruptive interruptions, costly emergency repairs, damage to our highly sophisticated science tools, as well as increasing resilience, correcting inadequate/unsafe working conditions, and eliminating inefficient and costly operations that impede research activities. SLI evaluates GPP proposals using annual assessment results (mentioned above) and multiple criteria including mission impact, readiness, cost savings (including energy and water), environmental, safety, and health issues, sustainability (including contributions to net zero initiatives), resilience, and reliability. The increase in the minor construction threshold to \$30 million makes the use of GPPs the appropriate vehicle for addressing more of the critical revitalization and emergency repair needs.

The FY 2025 Request will support an expansion of a Laboratory Operations Apprenticeship program that will be piloted in FY 2024. The apprenticeship program will ensure the next generation of diverse highly skilled trade and craft employees are ready to replace the critical aging and retiring workforce found throughout the SC laboratory complex. A unique and highly skilled craft and trade workers are required to build and maintain critical infrastructure and operations at SC laboratories. A SC Laboratory Operations Apprenticeship Program will develop a pipeline of highly and uniquely skilled employees to ensure continued infrastructure operations and maintenance for the many scientific user facilities. The program would be initiated as pilot SC apprenticeship program as a means to develop the processes and procedures to successfully administer apprenticeship programs for these workforce skills.

**Science Laboratories Infrastructure
Funding**

(dollars in thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
Science Laboratories Infrastructure				
Payment In Lieu of Taxes (PILT)	4,891	5,004	5,119	+228
OR Landlord	6,559	6,910	7,032	+473
Facilities and Infrastructure	13,900	32,104	50,029	+36,129
Laboratory Operations Apprenticeship	—	—	5,000	+5,000
Oak Ridge Nuclear Operations	26,000	46,000	46,000	+20,000
Subtotal, Science Laboratories Infrastructure	51,350	90,018	113,180	+61,830
Construction				
22-SC-71 Critical Infrastructure Modernization Project (CIMP) - ORNL	1,000	—	—	-1,000
22-SC-72 Thomas Jefferson Infrastructure Improvements (TJII) - TJNAF	1,000	—	—	-1,000
21-SC-71 Princeton Plasma Innovation Center (PPIC), PPPL	10,000	10,000	35,000	+25,000
21-SC-72 Critical Infrastructure Recovery & Renewal (CIRR), PPPL	4,000	10,000	20,000	+16,000
21-SC-73 Ames Infrastructure Modernization (AIM)	2,000	8,000	—	-2,000
20-SC-71 Critical Utilities Rehabilitation Project (CURP), BNL	26,000	—	—	-26,000
20-SC-72 Seismic and Safety Modernization (SSM), LBNL	27,500	35,000	18,000	-9,500
20-SC-73 CEBAF Renovation and Expansion (CEBAF), TJNAF	15,000	11,000	11,000	-4,000
20-SC-75 Large Scale Collaboration Center (LSCC), SLAC	21,000	—	—	-21,000
20-SC-77 Argonne Utilities Upgrade (AU2), ANL	8,000	8,000	3,000	-5,000

(dollars in thousands)

	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
20-SC-78 Linear Assets Modernization Project (LAMP), LBNL	23,425	18,900	30,000	+6,575
20-SC-79 Critical Utilities Infrastructure Revitalization (CUIR), SLAC	25,425	30,000	20,000	-5,425
20-SC-80 Utilities Infrastructure Project (UIP), FNAL	20,000	35,000	45,000	+25,000
19-SC-74 - BioEPIC, LBNL	45,000	38,000	—	-45,000
Subtotal, Construction	229,350	203,900	182,000	-47,350
Total, Science Laboratories Infrastructure	280,700	293,918	295,180	+14,480

Science Laboratories Infrastructure
Explanation of Major Changes

(dollars in thousands)

FY 2025 Request vs FY 2023 Enacted

Infrastructure Support

The Request increases funding for GPPs to address targeted and emerging high-priority infrastructure needs across the SC complex and continues a Laboratory Operations Apprenticeship to support trade and craft employee development.

+61,830

Construction

Funding supports 8 ongoing line-item projects at ANL, FNAL, LBNL, PPPL, SLAC, and TJNAF.

-47,350

Total, Science Laboratories Infrastructure

+14,480

Program Accomplishments

Line-Item Construction Projects

Since FY 2006, the SLI program has invested nearly \$1.2 billion to successfully complete 19 mission-enabling line-item construction projects that provided state-of-the-art science user support facilities, renovated, and repurposed aged facilities, upgraded inadequate core infrastructure and systems, and removed excess facilities. These investments began following an FY 2006 SC decision to modernize infrastructure across the SC-stewarded laboratory complex. With these investments, the SLI program constructed approximately 1.8 million gsf of new and modernized existing space. As a result, an estimated 3,050 laboratory users and researchers now occupy newly constructed and/or modernized buildings that better support scientific and technological innovation in a collaborative environment. SLI has been honored with 14 DOE Secretary's Achievement Awards for its contributions to the SC mission.

GPP upgrades across SC Laboratories

From FY 2016 through FY 2023, SLI has funded nearly \$280 million in 49 laboratory core infrastructure improvement projects including \$150 million in electrical and utility improvements, \$57 million in building renovations, \$44 million in safety and environmental projects, \$20 million in sustainability/resilience and \$8 million in other site improvement projects. Examples of FY 2023 SLI GPP investments in core infrastructure include the replacement of an emergency generator in the Waste Handling Facility at LBNL and conversion of the fossil fuel furnace serving the AUD-PSL buildings at PNNL to a hot water system using geothermal heat pumps.

Science Laboratories Infrastructure Infrastructure Support

Description

The Infrastructure Support subprogram invests in enabling infrastructure and specific laboratory operations. The Facilities and Infrastructure activity is critical for upgrading and replacing enabling infrastructure systems (e.g., utility systems, site-wide services, and general-purpose facilities) to improve reliability, resilience, efficiency, and performance, as well as to address emerging needs or end-of-life requirements. This subprogram also supports nuclear operations at ORNL, stewardship-type needs (e.g., roads and grounds maintenance) across the Oak Ridge Reservation, the expansion of a Laboratory Operations Apprenticeship program, and Payments In Lieu of Taxes (PILT).

Facilities and Infrastructure

This activity supports minor construction investments (general plant projects of less than \$34 million) that address urgent and emerging core infrastructure needs. SC laboratories conduct annual condition assessments of their core infrastructure to determine the investment targets for these basic systems that form the backbone of their campuses. SLI maintains an active and integrated list of critical core infrastructure investment priorities across all 10 laboratories. Projects are rigorously evaluated for mission dependency and readiness; cost savings (including energy and water cost savings); remediation of environmental, safety, and health issues; sustainability (including net zero initiatives); resilience; and reliability. The highest priority projects are selected for funding based on the totality of these criteria and availability of funds.

Oak Ridge Nuclear Operations

This activity supports critical DOE nuclear operations required to safely operate ORNL's non-reactor nuclear facilities (i.e., Buildings 7920, 7930, 3525, and 3025E) and the associated support facilities. These facilities support a variety of users including SC programs, the National Nuclear Security Administration, the Office of Nuclear Energy (NE), and other federal agencies. This funding provides general operations support, maintenance and repair of hot cells and supporting systems and ensures compliance with safety standards and procedures.

OR Landlord

This activity supports landlord responsibilities, including infrastructure, for the 24,000-acre Oak Ridge Reservation and DOE facilities in the city of Oak Ridge, Tennessee. The funding supports maintenance of roads, grounds, other infrastructure, and support and improvement of environmental protection, safety, and health.

Payment In Lieu of Taxes (PILT)

This activity supports SC stewardship responsibilities for PILT. The Department is authorized to provide discretionary payments to state and local government authorities for real property that is not subject to taxation because it is owned by the United States Federal Government and operated by the Department. Under this authorization, PILT is provided to communities around ANL, BNL, and ORNL to compensate for lost tax revenues for land removed from local tax rolls. PILT payments are negotiated between the Department and local governments based on land values and tax rates.

Laboratory Operations Apprenticeship

This activity supports an expansion of a Laboratory Operations Apprenticeship program that will be piloted in FY 2024. The apprenticeship program is focused on preparing and training the next generation of diverse highly skilled trade and craft employees, to replace the critical aging and retiring workforce found throughout the SC laboratory complex.

**Science Laboratories Infrastructure
Infrastructure Support**

Activities and Explanation of Changes

(dollars in thousands)

FY 2023 Enacted	FY 2025 Request	Explanation of Changes FY 2025 Request vs FY 2023 Enacted	
Infrastructure Support	\$51,350	\$113,180	+\$61,830
Facilities and Infrastructure	\$13,900	\$50,029	+\$36,129
Funding supports the replacement of the emergency generator at the LBNL Hazardous Waste Building, the Steam to Hot Water Conversion project in the Physical Sciences Laboratory at PNNL and the Storm Water Reuse project at TJNAF.	The Request will continue to support the highest priority enabling infrastructure needs across the SC complex. Projects being considered are: Building 680 Upgrade Entrance Portal at BNL (Design), Bethel Valley Central Campus 4000 Area 2.4kv to 13.8kv Upgrade at ORNL, Reactive Power Compensation at SLAC, Building 450 Chillers Upgrade – Phase 2 at ANL, Building 202 Smart Labs Energy Retrofit at ANL, South Campus Building Gas to Electric Conversion at PNNL, Excess Non Accelerator Facilities Demolition Phase 1 at Fermi, and Building 362 Smart Labs Energy Retrofit at ANL.	Increased funding will support at least eight new general plant projects at multiple laboratories, addressing some of the highest risks and needs for operations.	
Oak Ridge Nuclear Operations	\$26,000	\$46,000	+\$20,000
Funding supports critical nuclear operations and provides funding to manage ORNL’s nuclear facilities.	The Request will support the general operations of ORNL’s non-reactor nuclear facilities by the Office of Science.	Increased funding reflects a transfer of budget authority and responsibilities from NE in FY 2024. It will provide the full amount needed to support critical activities needed to operate the non-reactor nuclear facilities at ORNL.	
OR Landlord	\$6,559	\$7,032	+\$473
Funding continues support of landlord responsibilities across the Oak Ridge Reservation. Activities include maintenance of roads, grounds, and other infrastructure; and support and improvement of environmental protection, safety, and health.	The Request will continue to support landlord responsibilities across the Oak Ridge Reservation and in Oak Ridge. Activities include maintenance of roads, grounds, other infrastructure, and support and improvement of environmental protection, safety, and health.	Funding will support OR landlord requirements.	

(dollars in thousands)

FY 2023 Enacted	FY 2025 Request	Explanation of Changes FY 2025 Request vs FY 2023 Enacted
Payment In Lieu of Taxes (PILT) \$4,891	\$5,119	+\$228
Funding supports PILT payments to communities around ANL, BNL, and ORNL.	The Request will provide funding for PILT payments to communities around ANL, BNL, and ORNL.	Funding will support anticipated PILT requirements.
Laboratory Operations Apprenticeship \$ —	\$5,000	+\$5,000
No funding requested or appropriated in FY 2023.	The Request will support a program for technician- and craft-level apprenticeships in the SC complex.	Funding will expand the Laboratory Operations Apprenticeship program that will be initiated in FY 2024.

Science Laboratories Infrastructure Construction

Description

The SLI program funds line-item projects to maintain and enhance the general-purpose infrastructure at SC laboratories. SLI's infrastructure modernization construction projects are focused on the accomplishment of long-term science goals and strategies at each SC laboratory. The SLI program's main objectives are improvement of SC's physical assets and facilities modernization funding to enable emerging science opportunities. Modernizing enabling infrastructure at the SC national laboratories will ensure the critical support infrastructure meets the needs of the future science initiatives and world class user facilities, and will provide more efficient, resilient, reliable, environmentally sound, and safe laboratory operations.

The FY 2025 Request includes funding for eight ongoing line-item construction projects:

1. Princeton Plasma Innovation Center at PPPL;
2. Critical Infrastructure Recovery & Renewal at PPPL;
3. Seismic and Safety Modernization at LBNL;
4. CEBAF Renovation and Expansion at TJNAF;
5. Argonne Utilities Upgrade at ANL;
6. Linear Assets Modernization Project at LBNL;
7. Critical Utilities Infrastructure Revitalization at SLAC; and
8. Utilities Infrastructure Project at FNAL.

This Request includes no new line-item construction projects.

21-SC-71, Princeton Plasma Innovation Center, PPPL

The Princeton Plasma Innovation Center (PPIC) will provide a multi-purpose facility to PPPL to include; space for offices and remote collaboration, medium bay research labs for diagnostics and fabrication, and research activities to meet the SC mission and fulfill the research needs of the Fusion Energy Sciences (FES), Advanced Scientific Computing Research (ASCR), and Basic Energy Sciences (BES) programs.

PPIC received its most recent DOE Order 413.3B Critical Decision approval, CD-1, Approve Alternative Selection and Cost Range, on January 22, 2021. The project anticipates its CD-2, Approve Performance Baseline, review in the first quarter of FY 2025, which is subject to change consistent with its pre-CD-2 status. The current preliminary TEC range for this project is \$97,500,000 to \$117,500,000 and the preliminary Total Project Cost (TPC) range is \$99,700,000 to \$115,300,000. These cost ranges encompass the most feasible preliminary alternative at this time. The preliminary TEC point estimate for this project is \$107,500,000 and the preliminary TPC point estimate for this project is \$109,700,000.

21-SC-72, Critical Infrastructure Recovery & Renewal, PPPL

The Critical Infrastructure Recovery & Renewal (CIRR) project at PPPL will revitalize critical infrastructure that supports the PPPL campus. Upgrades that may be completed as part of the CIRR project include: the electrical distribution system; standby power; chilled water generation and distribution; distribution networks for steam, compressed air, sanitary waste, and condenser, storm, canal, and potable water; HVAC systems; and communication systems.

CIRR received its most recent DOE Order 413.3B Critical Decision (CD) approval, CD-1, Approve Alternative Selection and Cost Range, on February 24, 2021. The project anticipates its CD-3A, Approve Long-Lead Procurement and Early Site Preparation, review in the second quarter of FY 2025, which is subject to change with its pre-CD-2 status. The current preliminary TEC range for this project is \$80,100,000 to \$96,000,000. The preliminary TPC range for this project is \$81,800,000 to \$97,700,000 and These cost ranges encompass the most feasible preliminary alternatives at this time. The preliminary TEC point estimate is \$87,300,000 and the TPC point estimate for this project is \$89,000,000.

20-SC-72, Seismic and Safety Modernization, LBNL

The Seismic and Safety Modernization (SSM) project will address seismic safety issues and emergency response capabilities at LBNL. Specifically, it will provide modern facilities with the large congregation areas needed for emergency response, continuity of operations that meet today's building code standards. The project also collocates related functions such as a Cafeteria and Health Services.

SSM received its most recent DOE Order 413.3B Critical Decision (CD) approval, CD-2/3, Approve Performance Baseline and Start of Construction, on December 7, 2023. The next anticipated CD is CD-4 for the project is fourth quarter FY 2028. This project had a preliminary TEC range of \$112,800,000 to \$183,300,000 and a preliminary TPC range of \$116,600,000 to \$188,500,000. The TEC point estimate for this project is \$141,000,000 and the TPC point estimate for this project is \$145,000,000.

20-SC-73, CEBAF Renovation and Expansion, TJNAF

The CEBAF Renovation and Expansion (CRE) project will renovate existing space and provide new research, administrative, and support service space to accommodate SC's mission. The CEBAF center at TJNAF is experiencing frequent failures in their utility systems; with the completion of the ARC facility transfer to SC, renovation of the ARC and CEBAF facilities to consolidate and accommodate operational as well as visitor/educational functions efficiently will allow TJ to provide current and future needs.

CRE received its most recent DOE Order 413.3B Critical Decision (CD) approval, CD-1, Approve Alternative Selection and Cost Range, on March 18, 2020. The project estimates its CD-2/3A, Approve Performance Baseline and Start of Construction activities in ARC, review by the second quarter of FY 2025. This project is pre-CD-2; therefore, schedule estimates are subject to change. This project has a preliminary TEC range of \$46,600,000 to \$99,500,000 and a preliminary TPC range of \$69,300,000 to \$102,800,000. These cost ranges encompass the most feasible preliminary alternatives at this time. The preliminary TEC point estimate for this project is \$87,000,000 and the preliminary TPC point estimate for this project is \$90,300,000.

20-SC-77, Argonne Utilities Upgrade, ANL

The Argonne Utilities Upgrade (AU2) project at ANL will revitalize and selectively upgrade ANL's existing major utility systems to increase the reliability, capability, and safety of ANL's infrastructure to meet the DOE's mission. The project will focus on systems such as steam, water, sanitary sewer, chilled water, and electrical systems.

AU2 received its most recent DOE Order 413.3B Critical Decision (CD) approval, CD-3A, Approve Site Preparation Activities, on September 14, 2023. The project estimates its CD-2, Approve Baseline, review in the second quarter of FY 2030. This project is pre-CD-2; therefore, schedule estimates are subject to change. The preliminary TEC range for this project is \$172,000,000 to \$290,250,000. The preliminary TPC range for this project is \$173,000,000 to \$291,250,000. These cost ranges encompass the most feasible preliminary alternatives at this time. The preliminary TEC point estimate is \$215,000,000 and the TPC point estimate for this project is \$216,000,000.

20-SC-78, Linear Assets Modernization Project, LBNL

The Linear Assets Modernization Project (LAMP) at LBNL will upgrade high priority utility systems to increase the reliability, capability, resiliency, and safety of LBNL's infrastructure to meet the DOE's mission. The project will upgrade utility systems including, but not limited to, domestic water, natural gas, storm drain, sanitary sewer, electrical, and communications.

LAMP received its most recent DOE Order 413.3B Critical Decision (CD) approval, CD-1, Approve Alternative Selection and Cost Range, on April 13, 2022. The project anticipates its CD-3A, Approve Long-Lead Procurement and Early Site Preparation, review in the first quarter of FY 2026. This project is pre-CD-2; therefore, schedule estimates are subject to change. The preliminary TEC range for this project is \$164,000,000 to \$376,000,000. The preliminary TPC range for this project is \$170,000,000 to \$386,000,000. These cost ranges encompass the most feasible preliminary alternatives at this time. The preliminary TEC is \$236,000,000 and the preliminary TPC estimate for this project is \$242,000,000.

20-SC-79, Critical Utilities Infrastructure Revitalization, SLAC

The Critical Utilities Infrastructure Revitalization (CUIR) project's primary objective is to close enabling infrastructure gaps to support multi-program science missions as technologies, instruments, experimental parameters, sensitivities, and complexity associated with evolving science demand increases required reliability, resiliency, and service levels in electrical, mechanical, and civil systems site wide. The CUIR project will address the critical campus-wide utility and infrastructure issues by replacing, repairing, and modernizing the highest risk water/fire protection, sanitary sewer, storm drain, electrical, and cooling water system deficiencies.

CUIR received its most recent DOE Order 413.3B Critical Decision (CD) approval, CD-3A, approve Long-Lead Procurement and Early Site Preparation, on May 8, 2023. The next anticipated CD is CD-2/3 for the overall project is third quarter FY 2029. This project is pre-CD-2; therefore, schedule estimates are subject to change. The preliminary TEC range for this project is \$160,000,000 to \$306,000,000. The preliminary TPC range for this project is \$164,500,000 to \$310,500,000. These cost ranges encompass the most feasible preliminary alternatives at this time. The preliminary TEC estimate is \$204,000,000 and the preliminary TPC estimate for this project is \$208,500,000.

20-SC-80, Utilities Infrastructure Project, FNAL

The Utilities Infrastructure Project (UIP) at FNAL will modernize the highest risk to major utility systems across the FNAL campus. Specifically, this project will upgrade the industrial cooling water system, potable water distribution system, sanitary sewer and storm collection systems, natural gas distribution system, electrical distribution system, and the Central Utility Building. Selected portions of the systems at highest risk of failure will be modernized to assure safe, reliable, and efficient service to mission critical facilities. In addition, component upgrades will also increase capacity, reliability, and personnel safety at critical utilities.

UIP received its most recent DOE Order 413.3B Critical Decision (CD) approval, CD-1, Approve Alternative Selection and Cost Range, on February 23, 2022. CD-3A Long-Lead Procurement and Early Site Preparation review and approval is planned in fourth quarter of FY 2024. The last of three subprojects anticipates its CD-2, Approve Performance Baseline, review in the third quarter of FY 2029. This project is pre-CD-2; therefore, schedule estimates are subject to change. The preliminary TEC range for this project is \$248,000,000 to \$403,000,000 and the preliminary TPC range of \$252,000,000 to \$411,000,000. These cost ranges encompass the most feasible preliminary alternatives at this time. The preliminary TEC estimate is \$310,000,000 and the preliminary TPC estimate for this project \$314,000,000.

**Science Laboratories Infrastructure
Construction**

Activities and Explanation of Changes

(dollars in thousands)

FY 2023 Enacted		FY 2025 Request	Explanation of Changes FY 2025 Request vs FY 2023 Enacted
Construction	\$229,350	\$182,000	-\$47,350
21-SC-71, Princeton Plasma Innovation Center, PPPL	\$10,000	\$35,000	+\$25,000
Funding will support ongoing PED activities and initiate construction activities.		The Request will support the continuation of construction activities.	Funding will advance construction activities.
21-SC-72, Critical Infrastructure Recovery & Renewal, PPPL	\$4,000	\$20,000	+\$16,000
Funding will support ongoing PED activities and initiate construction and associated activities.		The Request will support the continuation of construction activities.	Funding will advance construction activities.
21-SC-73, Ames Infrastructure Modernization	\$2,000	\$ —	-\$2,000
Funding will support ongoing PED and construction activities.		The FY 2024 Request included final funding for this project.	No funding requested in FY 2025.
20-SC-71, Critical Utilities Rehabilitation Project, BNL	\$26,000	\$ —	-\$26,000
Funding will support ongoing construction activities.		Final funding for this project was received in FY 2023.	Final funding for this project was received in FY 2023.
20-SC-72, Seismic and Safety Modernization, LBNL	\$27,500	\$18,000	-\$9,500
Funding will support construction and associated activities.		The Request will provide final funding for this project and support continuation of construction activities.	Funding Request will provide final funding for this project in FY 2025 and support continuation construction activities.

(dollars in thousands)			
FY 2023 Enacted		FY 2025 Request	Explanation of Changes FY 2025 Request vs FY 2023 Enacted
20-SC-73, CEBAF Renovation and Expansion, TJNAF	\$15,000	\$11,000	-\$4,000
Funding will support ongoing PED and construction activities.		The Request will support partial construction activities.	Funding will advance construction activities.
20-SC-75, Large Scale Collaboration Center, SLAC	\$21,000	\$ —	-\$21,000
Funding will support ongoing construction activities.		Final funding for this project was received in FY 2023.	Final funding for this project was received in FY 2023.
20-SC-77, Argonne Utilities Upgrade, ANL	\$8,000	\$3,000	-\$5,000
Funding will support ongoing PED activities.		The Request will support construction activities.	Funding will support completion of design activities, and startup of construction activities.
20-SC-78, Linear Assets Modernization Project, LBNL	\$23,425	\$30,000	+\$6,575
Funding will support ongoing PED activities and early construction activities.		The Request will support construction activities.	Funding will support completion of design activities, and startup of construction activities.
20-SC-79, Critical Utilities Infrastructure Revitalization, SLAC	\$25,425	\$20,000	-\$5,425
Funding will support ongoing PED activities and initiate early construction activities.		The Request will support construction activities.	Funding will support completion of design activities, and startup of construction activities.
20-SC-80, Utilities Infrastructure Project, FNAL	\$20,000	\$45,000	+\$25,000
Funding will support ongoing PED activities and initiate early construction activities.		The Request will support construction activities.	Funding will support completion of design activities, and startup of construction activities.
19-SC-74, BioEPIC, LBNL	\$45,000	\$ -	-\$45,000
Funding will support ongoing construction activities.		The FY 2024 Request included final funding for this project.	No funding requested in FY 2025.

**Science Laboratories Infrastructure
Capital Summary**

(dollars in thousands)

	Total	Prior Years	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
Capital Operating Expenses						
Minor Construction Activities						
General Plant Projects	N/A	N/A	13,700	32,104	50,029	+36,329
Total, Capital Operating Expenses	N/A	N/A	13,700	32,104	50,029	+36,329

**Science Laboratories Infrastructure
Minor Construction Activities**

(dollars in thousands)

General Plant Projects (GPP)

GPPs (greater than \$5M and \$34M or less)

	Total	Prior Years	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
Bethel Valley Central Campus 4000 Area 2.4kv to 13.8 kV Upgrade at ORNL	9,690	—	—	—	9,690	+9,690
Reactive Power Compensation at SLAC	15,769	—	—	—	15,769	+15,769
Chiller Replacement (Building. 450) at ANL	15,820	—	—	6,530	9,290	+9,290
Steam to Hydronics Conversion Project at PNNL	5,400	—	5,400	—	—	-5,400
Emergency Generator Upgrades, Phase 1 at LBNL	5,500	—	5,500	—	—	-5,500
HVAC Upgrade Life Sciences Laboratory (Bldg.331) at PNNL	6,000	—	—	6,000	—	—
Power Quality Compensation Equipment Installation at SLAC	8,300	—	—	8,300	—	—
Electrical Component Replacement 88 Inch Cyclotron User (Bldg B88) at LBNL	6,000	—	—	6,000	—	—
Total GPPs (greater than \$5M and \$34M or less)	N/A	N/A	10,900	26,830	34,749	+23,849
Total GPPs \$5M or less	N/A	N/A	2,800	5,274	15,280	+12,480
Total, General Plant Projects (GPP)	N/A	N/A	13,700	32,104	50,029	+36,329
Total, Minor Construction Activities	N/A	N/A	13,700	32,104	50,029	+36,329

Note:

- GPP activities \$5M and less include design and construction for additions and/or improvements to land, buildings, replacements or addition to roads, and general area improvements.
AIP activities \$5M and less include minor construction at an existing accelerator facility.

**Science Laboratories Infrastructure
Institutional General Plant Projects (IGPP)**

Total	FY 2023 Enacted	FY 2024 Request	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
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Institutional General Plant Projects (IGPP)

IGPPs (greater than or equal to \$5M and less than \$30M)

Space Renovation Program - Bldg. 360 Area (Buildings 369 and 368), ANL	5,000	5,000	—	—	-5,000
High Voltage Substation Resilience and Redundancy Upgrades, ANL	12,950	—	12,950	—	—
B725 SDCC 1.2 MW Power & Cooling Upgrades, BNL	12,900	—	12,900	—	—
Switch Station SW-A3 Improvements, LBNL	21,000	21,000	—	—	-21,000
Sitewide Retaining Wall Improvements, LBNL	9,500	—	9,500	—	—
B77 CNC Machine Replacement, LBNL	6,600	—	6,600	—	—
B62 Highbay Renovation, LBNL	10,000	—	10,000	—	—
Modular HPC Data Center, LBNL	25,000	—	25,000	—	—
B86 HVAC Modernization, LBNL	16,000	—	16,000	—	—
B66 4th Floor Lab Upgrades, LBNL	10,000	—	—	10,000	+10,000
B84 Heating Electrification, LBNL	12,000	—	—	12,000	+12,000
Shuttle Shelter Modernizations, LBNL	5,000	—	—	5,000	+5,000
Fire Alarm Panel Replacements, LBNL	10,000	—	—	10,000	+10,000
B80 HVAC Modernization, LBNL	10,000	—	—	10,000	+10,000
B2 HVAC Modernization, LBNL	10,000	—	—	10,000	+10,000
Install Fire Pump Houses at 13J and 68 Water Tanks, LBNL	6,000	—	—	6,000	+6,000
Bldg. 3501 Sewage Treatment Plant Lift Station, ORNL	9,600	9,600	—	—	-9,600
Vehicle Charging Stations Installation, ORNL	6,000	—	6,000	—	—
Modernize B7600 (Experimental Gas Cooled Reactor - EGCR) Campus Utility, ORNL	9,600	—	9,600	—	—
Expand B7996 Melton Valley Warehouse, ORNL	11,000	—	11,000	—	—
Replace 4521 Cooling Tower, ORNL	9,600	—	9,600	—	—
Renovate B4500N Library, ORNL	13,000	—	13,000	—	—
Improve Melton Valley Campus South Access and Parking, ORNL	9,600	—	9,600	—	—
Replace Bethel Valley Campus Vehicle Bridge, ORNL	7,000	—	7,000	—	—
Improve Bethel Valley Campus Parking, ORNL	5,200	—	5,200	—	—
Modernize B4508, ORNL	11,900	—	—	11,900	+11,900
Improve B7667 Low Level Waste Site, ORNL	10,200	—	—	10,200	+10,200
Improve B7603 Basement and B7608 Vault, ORNL	10,200	—	—	10,200	+10,200
Modernize B4500N Wing 1, ORNL	12,000	—	—	12,000	+12,000

Construct Multiprogram Office Building #2, ORNL	11,000	—	—	11,000	+11,000
Construct Bethel Valley Central Campus Support Facility, ORNL	12,000	—	—	12,000	+12,000
Modernize 2000/3000 Area Utilities, ORNL	9,600	—	—	9,600	+9,600
300 Area Office, PNNL	9,483	9,483	—	—	-9,483
318 Hot Water Piping Upgrade, PNNL	8,000	8,000	—	—	-8,000
Advanced Secure Communications, PNNL	24,700	24,700	—	—	-24,700
318 HVAC Upgrade, PNNL	8,500	—	8,500	—	—
General Purpose Lab, PNNL	24,000	—	24,000	—	—
Secure Physical Sciences, PNNL	28,000	—	28,000	—	—
331 Research Support Office, PNNL	12,500	—	12,500	—	—
PNNL Physical Access Control System Upgrade, PNNL	10,000	—	—	10,000	+10,000
PNNL Richland North Central Infrastructure, PNNL	6,200	—	—	6,200	+6,200
Secure Computational and Data Sciences, PNNL	29,250	—	—	29,250	+29,250
Shipping and Receiving Replacement, PNNL	15,000	—	—	15,000	+15,000
East Campus Site & Utilities Improvement Project (ESUI), SLAC	10,000	10,000	—	—	-10,000
Total IGPPs (greater than or equal to \$5M and less than \$30M)	525,083	87,783	236,950	200,350	+112,567
Total IGPPs less than \$5M	68,911	33,470	15,693	19,748	-13,722
Total, Institutional General Plant Projects (IGPP)	593,994	121,253	252,643	220,098	+98,845

Note:

- Institutional General Plant Projects (IGPPs) are indirect funded minor construction activities that are general institutional in nature and address general purpose, site-wide needs.

**Science Laboratories Infrastructure
Construction Projects Summary**

(dollars in thousands)

	Total	Prior Years	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
22-SC-71, Critical Infrastructure Modernization Project (CIMP) - ORNL						
Total Estimated Cost (TEC)	409,000	1,000	1,000	–	–	-1,000
Other Project Cost (OPC)	4,000	2,000	–	–	–	–
Total Project Cost (TPC)	413,000	3,000	1,000	–	–	-1,000
22-SC-72, Thomas Jefferson Infrastructure Improvements (TJII) - TJNAF						
Total Estimated Cost (TEC)	67,000	1,000	1,000	–	–	-1,000
Other Project Cost (OPC)	1,000	1,000	–	–	–	–
Total Project Cost (TPC)	68,000	2,000	1,000	–	–	-1,000
21-SC-71, Princeton Plasma Innovation Center (PPIC), PPPL						
Total Estimated Cost (TEC)	107,500	17,900	10,000	15,000	35,000	+25,000
Other Project Cost (OPC)	2,190	1,913	–	–	–	–
Total Project Cost (TPC)	109,690	19,813	10,000	15,000	35,000	+25,000
21-SC-72, Critical Infrastructure Recovery & Renewal (CIRR), PPPL						
Total Estimated Cost (TEC)	87,300	2,150	4,000	10,000	20,000	+16,000
Other Project Cost (OPC)	1,700	1,392	–	–	–	–
Total Project Cost (TPC)	89,000	3,542	4,000	10,000	20,000	+16,000
21-SC-73, Ames Infrastructure Modernization (AIM)						
Total Estimated Cost (TEC)	30,000	20,000	2,000	8,000	–	-2,000
Other Project Cost (OPC)	1,000	507	–	–	–	–
Total Project Cost (TPC)	31,000	20,507	2,000	8,000	–	-2,000

(dollars in thousands)

	Total	Prior Years	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
20-SC-71, Critical Utilities Rehabilitation Project (CURP), BNL						
Total Estimated Cost (TEC)	92,000	66,000	26,000	—	—	-26,000
Other Project Cost (OPC)	1,000	1,000	—	—	—	—
Total Project Cost (TPC)	93,000	67,000	26,000	—	—	-26,000
20-SC-72, Seismic and Safety Modernization (SSM), LBNL						
Total Estimated Cost (TEC)	141,000	55,500	27,500	40,000	18,000	-9,500
Other Project Cost (OPC)	3,550	2,911	200	—	—	-200
Total Project Cost (TPC)	144,550	58,411	27,700	40,000	18,000	-9,700
20-SC-73, CEBAF Renovation and Expansion (CEBAF), TJNAF						
Total Estimated Cost (TEC)	87,000	24,000	15,000	11,000	11,000	-4,000
Other Project Cost (OPC)	3,900	1,492	600	—	—	-600
Total Project Cost (TPC)	90,900	25,492	15,600	11,000	11,000	-4,600
20-SC-74, Craft Resources Support Facility (CRSF), ORNL						
Total Estimated Cost (TEC)	40,000	40,000	—	—	—	—
Other Project Cost (OPC)	1,000	850	—	—	100	+100
Total Project Cost (TPC)	41,000	40,850	—	—	100	+100
20-SC-75, Large Scale Collaboration Center (LSCC), SLAC						
Total Estimated Cost (TEC)	55,000	43,000	21,000	—	—	-21,000
Other Project Cost (OPC)	2,000	504	400	950	146	-254
Total Project Cost (TPC)	57,000	43,504	21,400	950	146	-21,254
20-SC-77, Argonne Utilities Upgrade (AU2), ANL						
Total Estimated Cost (TEC)	215,000	11,000	8,000	8,007	3,000	-5,000
Other Project Cost (OPC)	1,000	1,000	—	—	—	—
Total Project Cost (TPC)	216,000	12,000	8,000	8,007	3,000	-5,000

(dollars in thousands)

	Total	Prior Years	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
20-SC-78, Linear Assets Modernization Project (LAMP), LBNL						
Total Estimated Cost (TEC)	236,000	11,400	23,425	18,900	30,000	+6,575
Other Project Cost (OPC)	6,000	3,263	–	–	–	–
Total Project Cost (TPC)	242,000	14,663	23,425	18,900	30,000	+6,575
20-SC-79, Critical Utilities Infrastructure Revitalization (CUIR), SLAC						
Total Estimated Cost (TEC)	204,000	9,500	25,425	35,075	20,000	-5,425
Other Project Cost (OPC)	4,389	2,672	–	–	250	+250
Total Project Cost (TPC)	208,389	12,172	25,425	35,075	20,250	-5,175
20-SC-80, Utilities Infrastructure Project (UIP), FNAL						
Total Estimated Cost (TEC)	310,000	11,500	20,000	45,000	45,000	+25,000
Other Project Cost (OPC)	4,000	2,050	–	–	–	–
Total Project Cost (TPC)	314,000	13,550	20,000	45,000	45,000	+25,000
19-SC-73, Translational Research Capability (TRC), ORNL						
Total Estimated Cost (TEC)	93,500	93,500	–	–	–	–
Other Project Cost (OPC)	1,500	1,400	–	100	–	–
Total Project Cost (TPC)	95,000	94,900	–	100	–	–
19-SC-74, BioEPIC, LBNL						
Total Estimated Cost (TEC)	165,000	82,000	45,000	38,000	–	-45,000
Other Project Cost (OPC)	2,200	1,536	–	–	–	–
Total Project Cost (TPC)	167,200	83,536	45,000	38,000	–	-45,000
Total, Construction						
Total Estimated Cost (TEC)	N/A	N/A	229,350	228,982	182,000	-47,350
Other Project Cost (OPC)	N/A	N/A	1,200	1,050	496	-704

(dollars in thousands)

	Total	Prior Years	FY 2023 Enacted	FY 2024 Annualized CR	FY 2025 Request	FY 2025 Request vs FY 2023 Enacted
Total Project Cost (TPC)	N/A	N/A	230,550	230,032	182,496	-48,054

Notes:

- *The current estimated TPC for the PPIC project is \$109,960,000.00. In FY 2023 an additional \$10,000 in OPC funding was obligated that is not reflected in this table.*
- *The current estimated TPC for the SSM project is \$145,000,000.00. In FY 2023 an additional \$450,000 in OPC funding was obligated that is not reflected in this table.*
- *The current estimated TPC for the CUIR project is \$208,500,000.00. In FY 2023 an additional \$11,000 in OPC funding was obligated that is not reflected in this table.*

**21-SC-71, Princeton Plasma Innovation Center, PPPL
Princeton Plasma Physics Laboratory, PPPL
Project is for Design and Construction**

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2025 Request for the Princeton Plasma Innovation Center (PPIC) project is \$35,000,000 of Total Estimated Cost (TEC) funding. The TEC range for this project is \$97,500,000 to \$117,500,000. The preliminary Total Project Cost (TPC) range for this project is \$99,700,000 to \$115,300,000. Currently, these cost ranges encompass the most feasible preliminary alternatives. The preliminary TPC estimate for this project is \$109,700,000.

This project will provide a multi-purpose facility with modern, flexible, efficient, and agile research laboratories and office space to conduct plasma research activities in support of multiple SC programs.

The most recent DOE Order 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on January 22, 2021.

A Federal Project Director with the appropriate certification level was assigned to this project.

Significant Changes

This project completed a conceptual design in August of 2020 and the construction industry has experienced significant cost escalation and the future of work has evolved to include teleworking. These changes have resulted in lower square footage needs for office space but also account for escalation in the cost to deliver the same amount of laboratory square footage. The revised preliminary TPC point estimate of \$109,700 reflects an increase from the previous point estimate of \$98,500,000 and range of \$80,500,000 to \$98,500,000.

This Construction Project Data Sheet (CPDS) is an update to the FY 2024 CPDS and is not a new start for FY 2025. FY 2025 funds will support construction activities after the appropriate CD approvals.

Critical Milestone History

Fiscal Year	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
FY 2025	9/9/19	8/25/20	1/22/21	1Q FY 2025	3Q FY 2024	1Q FY 2025	4Q FY 2028

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve Alternative Selection and Cost Range; **CD-2** – Approve Performance Baseline; **Final Design Complete** – Estimated/Actual date the project design will be/was complete(d); **CD-3** – Approve Start of Construction; **D&D Complete** – Completion of D&D work; **CD-4** – Approve Start of Operations or Project Closeout.

Fiscal Year	Performance Baseline Validation	CD-3A
FY 2025	1Q FY 2025	3Q FY 2024

CD-3A – Long Lead Procurements and Site Preparation Activities

Project Cost History

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2024	8,900	87,400	96,300	2,200	2,200	98,500
FY 2025	12,000	95,500	107,500	2,200	2,200	109,700

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

2. Project Scope and Justification

Scope

The Princeton Plasma Innovation Center (PPIC) is envisioned as a 50,000 to 75,000 gross square feet (gsf) multi-story office, reflecting reduced office space based on future of work changes, and laboratory building at Princeton Plasma Physics Laboratory (PPPL) to serve as a single new multi-use facility that will house space for offices, medium bay research labs for diagnostics and fabrication, remote experiment participation and collaboration, and research support. It is anticipated a review and approval for long-lead procurements (e.g., mechanical equipment, electrical equipment, structural steel, etc.) and site preparation (e.g., installation of geothermal wells) for CD-3A will occur in 3Q FY 2024.

Justification

To advance the plasma science and fusion frontier in support of the DOE mission, PPPL requires new or enhanced facilities and infrastructure to foster innovation to make fusion energy a practical reality and further U.S. economic competitiveness. The primary SC program relevant to the PPIC project is FES, and the primary core capability is Plasma and Fusion Energy Sciences. The missions of SC's ASCR and BES programs are also relevant mission needs for the PPIC with second order effect to Large Scale User Facilities/Advanced Instrumentation and Systems Engineering and Integration.

PPPL plays a key role in assisting FES achieve its strategic goals. PPPL carries out experiments and computer simulations of the behavior of plasma, with sufficient temperature to generate fusion reactions. PPPL's aims to be a leading center for future fusion concepts through industry collaborations that develop new modeling and measurement techniques to improve understanding of plasma processes and that develop innovations for the next generation microelectronics.

PPIC will enhance the configuration of PPPL infrastructure to accommodate future scientific efforts and address the lack of adequate laboratory infrastructure, modern collaboration space, and modern office infrastructure

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

Key Performance Parameters (KPPs)

The KPPs are preliminary and may change as the project continues towards CD-2. At CD-2 approval, the KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
Multi-Story Building	50,000 gsf	75,000 gsf

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Total Estimated Cost (TEC)				
Design (TEC)				
Prior Years	7,900	7,900	1,114	—
Prior Years - IRA Supp.	1,000	1,000	—	—
FY 2023	3,100	3,100	—	3,075
FY 2024	—	—	5,286	25
FY 2025	—	—	2,500	—
Total, Design (TEC)	12,000	12,000	8,900	3,100
Construction (TEC)				
Prior Years - IRA Supp.	9,000	9,000	—	—
FY 2023	6,900	6,900	—	—
FY 2024	15,000	15,000	1,000	6,900
FY 2025	35,000	35,000	33,000	—
Outyears	29,600	29,600	54,600	—
Total, Construction (TEC)	95,500	95,500	88,600	6,900
Total Estimated Cost (TEC)				
Prior Years	7,900	7,900	1,114	—
Prior Years - IRA Supp.	10,000	10,000	—	—
FY 2023	10,000	10,000	—	3,075
FY 2024	15,000	15,000	6,286	6,925
FY 2025	35,000	35,000	35,500	—
Outyears	29,600	29,600	54,600	—
Total, Total Estimated Cost (TEC)	107,500	107,500	97,500	10,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
Prior Years	1,913	1,913	1,913
FY 2023	10	10	10
Outyears	277	277	277
Total, Other Project Cost (OPC)	2,200	2,200	2,200

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Total Project Cost (TPC)				
Prior Years	9,813	9,813	3,027	—
Prior Years - IRA Supp.	10,000	10,000	—	—
FY 2023	10,010	10,010	10	3,075
FY 2024	15,000	15,000	6,286	6,925
FY 2025	35,000	35,000	35,500	—
Outyears	29,877	29,877	54,877	—
Total, TPC	109,700	109,700	99,700	10,000

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	9,500	7,900	N/A
Design - Contingency	2,500	1,000	N/A
Total, Design (TEC)	12,000	8,900	N/A
Construction	75,600	72,000	N/A
Construction - Contingency	19,900	15,400	N/A
Total, Construction (TEC)	95,500	87,400	N/A
Total, TEC	107,500	96,300	N/A
<i>Contingency, TEC</i>	<i>22,400</i>	<i>16,400</i>	<i>N/A</i>
Other Project Cost (OPC)			
Conceptual Planning	300	300	N/A
Conceptual Design	1,700	1,700	N/A
OPC - Contingency	200	200	N/A
Total, Except D&D (OPC)	2,200	2,200	N/A
Total, OPC	2,200	2,200	N/A
<i>Contingency, OPC</i>	<i>200</i>	<i>200</i>	<i>N/A</i>
Total, TPC	109,700	98,500	N/A
Total, Contingency (TEC+OPC)	22,600	16,600	N/A

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2023	FY 2024	FY 2025	Outyears	Total
FY 2024	TEC	17,900	10,000	15,000	—	53,400	96,300
	OPC	1,929	—	—	—	271	2,200
	TPC	19,829	10,000	15,000	—	53,671	98,500
FY 2025	TEC	17,900	10,000	15,000	35,000	29,600	107,500
	OPC	1,913	10	—	—	277	2,200
	TPC	19,813	10,010	15,000	35,000	29,877	109,700

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	4Q FY 2028
Expected Useful Life	50 years
Expected Future Start of D&D of this capital asset	4Q FY 2078

Related Funding Requirements

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	1,336	1,336	46,774	46,774
Utilities	198	198	6,936	6,936
Maintenance and Repair	1,518	1,518	53,154	53,154
Total, Operations and Maintenance	3,052	3,052	106,864	106,864

7. D&D Information

The new area being constructed in this project is not replacing existing facilities.

	Square Feet
New area being constructed by this project at PPPL	50,000-75,000
Area of D&D in this project at PPPL	13,400
Area at PPPL to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None ^b
Area of D&D in this project at other sites	None
Area at other sites to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None
Total area eliminated	13,400

8. Acquisition Approach

The PPPL Management and Operating (M&O) Contractor, Princeton University, is performing the acquisition for this project, overseen by the Princeton Site Office. The M&O contractor is responsible for awarding and managing all subcontracts related to this project. Project performance metrics will be performed by in-house management and Project Controls.

^b With the implementation of OMB's Reduce the Footprint initiative, DOE no longer maintains the space bank. Footprint is managed using the Facility Information Management System, with decisions on additions and offsets made in accordance with the DOE Real Property Efficiency Plan.

21-SC-72, Critical Infrastructure Recovery & Renewal, PPPL
Princeton Plasma Physics Laboratory, PPPL
Project is for Design and Construction

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2025 Request for the Critical Infrastructure Recovery & Renewal (CIRR) project is \$20,000,000 of Total Estimated Cost (TEC) funding. The preliminary TEC range for this project is \$80,100,000 to \$96,000,000. The preliminary Total Project Cost (TPC) range for this project is \$81,800,000 to \$97,700,000. Currently, these cost ranges encompass the most feasible preliminary alternatives. The preliminary TPC estimate for this project is \$89,000,000.

Princeton Plasma Physics Laboratory's (PPPL's) increasingly unreliable, and antiquated utility infrastructure is negatively impacting laboratory operations. Scientific productivity is dependent on a capable, available, flexible, maintainable, reliable, and resilient support infrastructure. This project will provide critical infrastructure needed to operate the laboratory missions safely and efficiently. These systems will be modern and energy efficient, reducing the operating cost and improving the resilience of the facilities.

The most recent DOE Order 413.3B Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on February 24, 2021.

A Federal Project Director working towards the appropriate certification level is assigned to this project.

Significant Changes

This Construction Project Data Sheet (CPDS) is an update to the FY 2024 CPDS and is not a new start for FY 2025. FY 2025 funds will continue to fund construction after the appropriate critical decisions.

A transformer replacement, which was originally identified as critical infrastructure needed to operate the laboratory missions safely and efficiently, and therefore identified as CIRR scope, has experienced significant deterioration and increased risk of failure. Because of these increased risks to operations and ease of executing independently as a complete and usable project, the transformer replacement has been removed from the project and accelerated for faster delivery.

Critical Milestone History

Fiscal Year	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
FY 2025	9/16/19	2/23/21	2/23/21	3Q FY 2025	2Q FY 2025	3Q FY 2025	2Q FY 2028

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve Alternative Selection and Cost Range; **CD-2** – Approve Performance Baseline; **Final Design Complete** – Estimated/Actual date the project design will be/was complete(d); **CD-3** – Approve Start of Construction; **D&D Complete** – Completion of D&D work; **CD-4** – Approve Start of Operations or Project Closeout.

Fiscal Year	Performance Baseline Validation	CD-3A
FY 2025	3Q FY 2025	2Q FY 2025

CD-3A – Approve Long-Lead Procurements and Site Preparation Activities

Project Cost History

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2024	9,950	77,350	87,300	1,700	1,700	89,000
FY 2025	9,950	77,350	87,300	1,700	1,700	89,000

Notes:

- *This project has not received CD-2 approval; therefore, funding estimates are preliminary.*
- *Other Project Costs (OPC) are funded through laboratory overhead.*

2. Project Scope and Justification

Scope

The CIRR project at PPPL will revitalize critical infrastructure that supports the PPPL campus to ensure reliability and resilience. Upgrades that may be completed as part of the CIRR project include: the electrical distribution system; standby power; chilled water generation and distribution; distribution networks for steam, compressed air, sanitary waste, and condenser, storm, canal, and potable water; HVAC systems; and communication systems. The scientific activities that require reliable and resilient utilities include National Spherical Torus Experiment-Upgrade (NSTX-U), Facility for Laboratory Reconnection Experiments (FLARE), and Lithium Tokamak Experiment-Beta (LTX-β).

The specifics of long-lead electrical equipment procurement will be reviewed and approved in support of CD-3A.

Justification

PPPL is a key DOE contributor to plasma science and directly supports the DOE mission to make fusion energy a practical reality and further U.S. economic competitiveness. To maintain system operability, it is essential to have reliable infrastructure in place. The current systems are past their useful life, obsolete, unreliable, and inefficient. Portions of the current system are part of the original infrastructure built in 1958. To maintain current missions and enable future ones, the infrastructure must be upgraded with modern, efficient, and reliable systems.

CIRR will deliver modern and resilient general-purpose infrastructure which will be more reliable, efficient, and sustainable and meet current industry standards. For example, replacing the obsolete hot deck/cold deck HVAC system will not only result in repair savings, but will generate energy savings as well. Every element of this project will be designed to consider the best available and most efficient technology and employ artificial intelligence systems to enhance operations and maintenance of new systems and equipment.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

Key Performance Parameters (KPPs)

The KPPs are preliminary and may change as the project continues towards CD-2. At CD-2 approval, the KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
Chilled Water Generation	<ul style="list-style-type: none"> Improve configuration and efficiency of the Central Chilled Water Plant to ensure distribution of 1,200 tons of cooling capacity to the site. 	<ul style="list-style-type: none"> N/A
Communications Distribution Network	<ul style="list-style-type: none"> Improve data infrastructure cabling and components by replacing existing copper cable with 2,000 linear feet of cat 6 cable. Provide 2,500 linear feet of 48 strand network fiber cable connected to the PU Computer Center. Provide 15,000 linear feet of 24 strand fiber optic cable to support site wide communication. 	<ul style="list-style-type: none"> Threshold plus upgrade additional communication system components to improve security, reliability, and flexibility.
Electrical Distribution & Standby Power	<ul style="list-style-type: none"> Create redundancy and improve mission readiness of the primary electrical distribution system in the 138 kV Yard. Provide site-wide capacity of standby generation at 3,500 KW. Upgrade 8 Substations for priority buildings and facilities. 	<ul style="list-style-type: none"> Increase site-wide capacity of standby generation up to 4,350 KW. Upgrade up to 10 substations for additional buildings/facilities to improve flexibility for maintenance and operations.
HVAC Systems	<ul style="list-style-type: none"> Upgrade 8 HVAC system equipment for priority buildings on C-Site and D-Site. 	<ul style="list-style-type: none"> Upgrade up to 14 HVAC system equipment for additional buildings to meet sustainability goals and improve maintenance and operations.
Underground Distribution Network	<ul style="list-style-type: none"> Replace all failed critical underground piping, valves, and components for campus utilities. Replace 1,700 linear feet of electrical feeders (26kv) for improved reliability. Upgrade 9,500 sqft. of Storm Retention Basin liner. 	<ul style="list-style-type: none"> Threshold plus upgrade additional underground system components to improve maintenance and reliability.

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
Design (TEC)			
Prior Years	2,150	2,150	31
FY 2023	4,000	4,000	324
FY 2024	3,800	3,800	5,000
FY 2025	—	—	4,595
Total, Design (TEC)	9,950	9,950	9,950
Construction (TEC)			
FY 2024	6,200	6,200	—
FY 2025	20,000	20,000	15,000
Outyears	51,150	51,150	62,350
Total, Construction (TEC)	77,350	77,350	77,350
Total Estimated Cost (TEC)			
Prior Years	2,150	2,150	31
FY 2023	4,000	4,000	324
FY 2024	10,000	10,000	5,000
FY 2025	20,000	20,000	19,595
Outyears	51,150	51,150	62,350
Total, Total Estimated Cost (TEC)	87,300	87,300	87,300

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
Prior Years	1,392	1,392	1,392
Outyears	308	308	308
Total, Other Project Cost (OPC)	1,700	1,700	1,700

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Project Cost (TPC)			
Prior Years	3,542	3,542	1,423
FY 2023	4,000	4,000	324
FY 2024	10,000	10,000	5,000
FY 2025	20,000	20,000	19,595
Outyears	51,458	51,458	62,658
Total, TPC	89,000	89,000	89,000

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	7,600	7,600	N/A
Design - Contingency	2,350	2,350	N/A
Total, Design (TEC)	9,950	9,950	N/A
Construction	59,500	59,500	N/A
Construction - Contingency	17,850	17,850	N/A
Total, Construction (TEC)	77,350	77,350	N/A
Total, TEC	87,300	87,300	N/A
<i>Contingency, TEC</i>	<i>20,200</i>	<i>20,200</i>	<i>N/A</i>
Other Project Cost (OPC)			
Conceptual Planning	200	200	N/A
Conceptual Design	1,300	1,300	N/A
OPC - Contingency	200	200	N/A
Total, Except D&D (OPC)	1,700	1,700	N/A
Total, OPC	1,700	1,700	N/A
<i>Contingency, OPC</i>	<i>200</i>	<i>200</i>	<i>N/A</i>
Total, TPC	89,000	89,000	N/A
Total, Contingency (TEC+OPC)	20,400	20,400	N/A

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2023	FY 2024	FY 2025	Outyears	Total
FY 2024	TEC	2,150	4,000	10,000	—	71,150	87,300
	OPC	1,352	—	—	—	348	1,700
	TPC	3,502	4,000	10,000	—	71,498	89,000
FY 2025	TEC	2,150	4,000	10,000	20,000	51,150	87,300
	OPC	1,392	—	—	—	308	1,700
	TPC	3,542	4,000	10,000	20,000	51,458	89,000

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	2Q FY 2028
Expected Useful Life	50 years
Expected Future Start of D&D of this capital asset	N/A

Related Funding Requirements
(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	1,100	1,100	55,000	55,000
Utilities	N/A	N/A	N/A	N/A
Maintenance and Repair	1,000	1,000	50,000	50,000
Total, Operations and Maintenance	2,100	2,100	105,000	105,000

7. D&D Information

This project replaces critical infrastructure components; no new construction area is anticipated to be constructed in this project and it will not replace existing facilities.

	Square Feet
New area being constructed by this project at PPPL	None
Area of D&D in this project at PPPL	None
Area at PPPL to be transferred, sold, and/or D&D outside the project, including area previously “banked”	None
Area of D&D in this project at other sites	None
Area at other sites to be transferred, sold, and/or D&D outside the project, including area previously “banked”	None
Total area eliminated	None

8. Acquisition Approach

The PPPL Management and Operating (M&O) Contractor, Princeton University, will perform the acquisition for this project, overseen by the Princeton Site Office. The M&O Contractor will be responsible for awarding and managing all subcontracts related to the project. Project performance metrics will be performed by in-house management and Project Controls.

20-SC-72, Seismic and Safety Modernization, LBNL
Lawrence Berkeley National Laboratory, LBNL
Project is for Design and Construction

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2025 Request for the Seismic and Safety Modernization (SSM) project is \$18,000,000 of Total Estimated Cost (TEC) funding. The TEC range for this project is \$112,800,000 to \$183,300,000. The preliminary Total Project Cost (TPC) range for this project is \$116,600,000 to \$188,500,000. Currently, these cost ranges encompass the most feasible preliminary alternatives. The TPC estimate for this project is \$145,000,000.

The most recently approved DOE Order 413.3B Critical Decision (CD) is CD-2/3 on December 7, 2023, to Approve Performance Baseline and Start of Construction. The project received \$22,500,000 in Inflation Reduction Act (IRA) funding, which has been obligated and should be fully costed by FY 2024, to increase the TPC and initiate long lead procurement and site preparation to mitigate the risks of escalation.

A Federal Project Director with the appropriate certification level has been assigned to this project.

Significant Changes

This Construction Project Data Sheet (CPDS) is an update to the FY 2024 CPDS and is not a new start for FY 2025. FY 2025 funds will support the highest priority construction activities.

Critical Milestone History

Fiscal Year	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
FY 2025	12/21/22	6/17/19	01/13/23	12/7/2023	10/1/21	12/7/23	4Q FY 2028

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve Alternative Selection and Cost Range; **CD-2** – Approve Performance Baseline; **Final Design Complete** – Estimated/Actual date the project design will be/was complete(d); **CD-3** – Approve Start of Construction; **D&D Complete** – Completion of D&D work; **CD-4** – Approve Start of Operations or Project Closeout.

Note:

- CD-0 was originally approved on 9/6/2018, and has been updated to remove seismic upgrades to the firehouse.
- CD-1 was originally approved in 2019 and has been updated to reflect the current cost range.

Fiscal Year	Performance Baseline Validation	CD-3A
FY 2025	12/7/23	01/13/23

CD-3A – Approve Long-Lead Procurement and Site Preparation Activities.

Project Cost History

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2024	12,000	129,000	141,000	4,000	4,000	145,000
FY 2025	12,000	129,000	141,000	4,000	4,000	145,000

Notes:

- Other Project Costs (OPC) are funded through laboratory overhead.

2. Project Scope and Justification

Scope

The SSM project will construct a new 47,700 (approximately) gross square feet facility on the existing cafeteria site to house the cafeteria, health services and operational support services (human resources, conferencing, and other potential groups) to meet the requirements of Risk Category III of the California Building Code (CBC).

Justification

LBNL executes 22 of the Office of Science's (SC's) 24 core capabilities and the mission of multiple SC program offices, including ASCR, BER, BES, and HEP programs. LBNL is located on a 202-acre site in the hills above the University of California, Berkeley campus, employs approximately 3,400 full time employees, and is home to five SC national user facilities: the Advanced Light Source, the Energy Sciences Network, the Joint Genome Institute, the Molecular Foundry, and the National Energy Research Scientific Computing Center. In FY 2016, over 11,000 researchers used these facilities, representing roughly one third of the total for all SC user facilities. In pursuing the SC mission, LBNL leverages collaborative science to bring together teams of individuals with different fields of expertise to work together on common solutions to the SC mission. However, these research activities must be executed with a unique caution since LBNL is located less than one mile from the Hayward Fault and less than 25 miles from the San Andreas Fault, which would both pose a life safety risk to employees, visitors, and guests during a significant seismic event.

The U.S. Geological Survey's earthquake forecast, the third Uniform California Earthquake Rupture Forecast, states a 98 percent probability of a 6.0 magnitude or higher earthquake in the San Francisco Bay Area before 2043. Recent engineering evaluations from a San Francisco Bay Area structural engineering firm have identified significant and extensive seismic safety hazards in critical LBNL support buildings, including the Cafeteria and Health Services. Structural deficiencies identified in these buildings will likely cause significant structural damage with life safety hazards during a magnitude 6.0+ earthquake on the Hayward Fault or a magnitude 8.3 earthquake on the San Andreas Fault and will impede LBNL's ability to resume operations.

The SSM project will address seismic safety issues and emergency response capabilities, specifically related to facilities with large congregation areas as well as transportation capabilities that are necessary for emergency response personnel and maintaining continuity of operations. Demolition of the existing cafeteria and site preparation activities were initiated prior to CD-2 under the CD-3A authorization to minimize risks and schedule delays and ultimately allow for construction of a new, more sustainable, and operationally resilient facility. Additional supporting functions such as utilities or site modifications may be included in the project as deemed necessary.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

Key Performance Parameters (KPPs)

At CD-2 approval, the KPPs were baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
New Facility to include a Cafeteria, Health Services & Operational Support Services	<ul style="list-style-type: none"> 35,000 gross square feet (gsf). Meet requirements of Risk Category III of the CBC. 	<ul style="list-style-type: none"> 60,000 gsf N/A

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Total Estimated Cost (TEC)				
Design (TEC)				
Prior Years	12,000	12,000	8,801	—
FY 2023	—	—	113	—
FY 2024	—	—	3,086	—
Total, Design (TEC)	12,000	12,000	12,000	—
Construction (TEC)				
Prior Years	21,000	21,000	—	—
Prior Years - IRA Supp.	22,500	22,500	—	—
FY 2023	27,500	27,500	500	4,374
FY 2024	40,000	40,000	16,400	18,126
FY 2025	18,000	18,000	45,000	—
Outyears	—	—	44,600	—
Total, Construction (TEC)	129,000	129,000	106,500	22,500
Total Estimated Cost (TEC)				
Prior Years	33,000	33,000	8,801	—
Prior Years - IRA Supp.	22,500	22,500	—	—
FY 2023	27,500	27,500	613	4,374
FY 2024	40,000	40,000	19,486	18,126
FY 2025	18,000	18,000	45,000	—
Outyears	—	—	44,600	—
Total, Total Estimated Cost (TEC)	141,000	141,000	118,500	22,500

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
Prior Years	2,911	2,911	2,911
FY 2023	650	650	650
Outyears	439	439	439
Total, Other Project Cost (OPC)	4,000	4,000	4,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Total Project Cost (TPC)				
Prior Years	35,911	35,911	11,712	—
Prior Years - IRA Supp.	22,500	22,500	—	—
FY 2023	28,150	28,150	1,263	4,374
FY 2024	40,000	40,000	19,486	18,126
FY 2025	18,000	18,000	45,000	—
Outyears	439	439	45,039	—
Total, TPC	145,000	145,000	122,500	22,500

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	10,300	10,300	N/A
Design - Contingency	1,700	1,700	N/A
Total, Design (TEC)	12,000	12,000	N/A
Construction	108,000	108,000	N/A
Construction - Contingency	21,000	21,000	N/A
Total, Construction (TEC)	129,000	129,000	N/A
Total, TEC	141,000	141,000	N/A
<i>Contingency, TEC</i>	<i>22,700</i>	<i>22,700</i>	<i>N/A</i>
Other Project Cost (OPC)			
Conceptual Planning	300	600	N/A
Conceptual Design	2,500	2,200	N/A
OPC - Contingency	1,200	1,200	N/A

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total, Except D&D (OPC)	4,000	4,000	N/A
Total, OPC	4,000	4,000	N/A
Contingency, OPC	1,200	1,200	N/A
Total, TPC	145,000	145,000	N/A
Total, Contingency (TEC+OPC)	23,900	23,900	N/A

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2023	FY 2024	FY 2025	Outyears	Total
FY 2024	TEC	55,500	27,500	40,000	—	18,000	141,000
	OPC	2,911	250	—	—	839	4,000
	TPC	58,411	27,750	40,000	—	18,839	145,000
FY 2025	TEC	55,500	27,500	40,000	18,000	—	141,000
	OPC	2,911	650	—	—	439	4,000
	TPC	58,411	28,150	40,000	18,000	439	145,000

Notes:

- Other Project Costs (OPC) are funded through laboratory overhead.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	4Q FY 2028
Expected Useful Life	50 years
Expected Future Start of D&D of this capital asset	4Q FY 2078

Related Funding Requirements
(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	N/A	N/A	N/A	N/A
Utilities	53	53	2,658	2,658
Maintenance and Repair	318	318	15,882	15,882
Total, Operations and Maintenance	371	371	18,540	18,540

7. D&D Information

The new area being constructed in this project is replacing existing facilities.

	Square Feet
New area being constructed by this project at LBNL	35,000 - 60,000
Area of D&D in this project at LBNL	13,605
Area at LBNL to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None
Area of D&D in this project at other sites	None
Area at other sites to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None
Total area eliminated	13,605

8. Acquisition Approach

The LBNL Management and Operating (M&O) Contractor, University of California, will perform the acquisition for this project, overseen by the Berkeley Site Office. The M&O contractor is responsible for awarding and managing all subcontracts related to this project. Project performance metrics will be performed by in-house management and Project Controls.

20-SC-73, CEBAF Renovation and Expansion, TJNAF
Thomas Jefferson National Accelerator Facility, TJNAF
Project is for Design and Construction

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2025 Request for the Continuous Electron Beam Accelerator Facility (CEBAF) Renovation and Expansion (CRE) project is \$11,000,000. The preliminary Total Estimated Cost (TEC) range for this project is \$46,600,000 to \$99,500,000. The preliminary Total Project Cost (TPC) range for this project is \$69,300,000 to \$102,800,000. Currently, these cost ranges encompass the most feasible preliminary alternatives. The preliminary TPC estimate for this project is \$90,300,000.

The CEBAF center at TJNAF has inadequate utility systems that are experiencing frequent failures. This project will renovate 95,000 to 247,000 gross square feet (gsf) of existing space in the CEBAF center and the Applied Research Center (ARC) space for visitors, users, research, education, and support and upgrade utility systems that are at the end of their useful life. To accommodate ongoing operations during the project, the ARC renovation will be executed prior to the CEBAF renovation.

A Federal Project Director with the appropriate certification has been assigned to this project.

Significant Changes

The most recent DOE Order 413.3B Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on March 18, 2020. FY 2025 funds will support design activities, and construction and associated activities.

Critical Milestone History

Fiscal Year	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
FY 2025	7/20/18	10/16/19	3/18/20	2Q FY 2025	2Q FY 2025	2Q FY 2026	2Q FY 2031

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve Alternative Selection and Cost Range; **CD-2** – Approve Performance Baseline; **Final Design Complete** – Estimated/Actual date the project design will be/was complete(d); **CD-3** – Approve Start of Construction; **D&D Complete** – Completion of D&D work; **CD-4** – Approve Start of Operations or Project Closeout.

Fiscal Year	Performance Baseline Validation	CD-3A	CD-3B
FY 2025	2Q FY 2025	2Q FY 2025	2Q FY 2026

CD-3A – Approve start of construction activities in ARC.

CD-3B – Approve Start of Remaining Construction Activities in CEBAF

Project Cost History

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2024	7,000	80,000	87,000	3,300	3,300	90,300
FY 2025	9,500	77,500	87,000	3,300	3,300	90,300

Notes:

- *This project has not received CD-2 approval; therefore, funding estimates are preliminary.*
- *Other Project Costs (OPC) are funded through laboratory overhead.*

2. Project Scope and Justification

Scope

The scope of the CRE project will include renovating 95,000 to 247,000 gsf of office and laboratory space (including acquisition of the ARC) for 120 to 200 research, education, and support staff. The renovation will include reconfiguration to provide more functional, flexible, and efficient spaces that meet current code standards. CRE will replace the mechanical systems in the existing CEBAF Center, which have exceeded their service life and experienced multiple failures. The CRE project will be designed to support climate resilience by accounting for projected changes in temperature and precipitation, energy and water efficiency, and enhanced monitoring of assets to reduce the risk of failure. The renovated building will meet modern building performance standards, including energy conservation, green building principles, and sustainable design, including provisions for approximately 100 geothermal wells. Upon completion, SC will relocate administrative and support staff from the Service Support Center (SSC) (leased space) and CEBAF into the ARC, and TJNAF will dedicate the CEBAF Center to scientific staff which will collectively and efficiently address functional workspace needs for TJNAF staff and users.

Justification

With nearly 1,600 users, TJNAF supports one of the largest nuclear physics user communities in the world. The expanded scientific scope associated with the 12 GeV upgrade (e.g., double the energy with simultaneous delivery to four experimental halls) is creating more and larger collaborations, requiring more technical workshops, and resulting in more visitors to the Laboratory. The Laboratory expects staff and user population to increase two percent per year for the next ten years and will soon exceed available space, which is already near capacity. Further, TJNAF is actively pursuing several large multi-program transfer projects such as the cryomodules and cryogenics plants for Linac Coherent Light Source (LCLS)-I, LCLS-II-High Energy, Facility for Rare Isotope Beams (FRIB), and the Utilities Upgrade Project (UUP) that will require additional staffing. TJNAF will continue to play a key role in the design and development of emerging SC initiatives.

Currently, TJNAF is lacking technically equipped and functional space to accommodate advanced scientific research and major missions on the immediate horizon. The existing CEBAF Center is well beyond full capacity. The current occupant density of this building is 110 gsf per occupant which is significantly below the DOE standard of 180 gsf per occupant. In addition, utility systems at the CEBAF center are inadequate, failing, and inefficient for the existing usage.

As part of TJNAF's strategic campus plan, CRE will deliver more efficient, collaborative, and functional workspaces that consolidates the Laboratory workforce scattered over several leased buildings into a single center. The project consolidates workers currently housed in the ARC and SSC leased spaces to efficiently addresses functional workspace needs, allows leases to be discontinued, and reduces the cost to sustain existing buildings and infrastructure. This project will provide upgraded laboratories and additional space for visitors, users, research, education, and support especially for new science capabilities such as 12 GeV and upcoming Electron Ion Collider (EIC) at BNL.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

Key Performance Parameters (KPPs)

The KPPs are preliminary and may change as the project continues towards CD-2. At CD-2 approval, the KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
CEBAF Center/ARC Renovation	95,000 gsf	247,000 gsf

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Total Estimated Cost (TEC)				
Design (TEC)				
Prior Years	6,000	6,000	4,472	—
FY 2023	2,000	2,000	887	—
FY 2024	1,000	1,000	3,551	—
FY 2025	500	500	590	—
Total, Design (TEC)	9,500	9,500	9,500	—
Construction (TEC)				
Prior Years	8,000	8,000	—	—
Prior Years - IRA Supp.	10,000	10,000	—	—
FY 2023	13,000	13,000	—	—
FY 2024	10,000	10,000	—	3,000
FY 2025	10,500	10,500	6,000	3,000
Outyears	26,000	26,000	61,500	4,000
Total, Construction (TEC)	77,500	77,500	67,500	10,000
Total Estimated Cost (TEC)				
Prior Years	14,000	14,000	4,472	—
Prior Years - IRA Supp.	10,000	10,000	—	—
FY 2023	15,000	15,000	887	—
FY 2024	11,000	11,000	3,551	3,000
FY 2025	11,000	11,000	6,590	3,000
Outyears	26,000	26,000	61,500	4,000
Total, Total Estimated Cost (TEC)	87,000	87,000	77,000	10,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Other Project Cost (OPC)				
Prior Years	1,492	1,492	1,492	–
Outyears	1,808	1,808	1,808	–
Total, Other Project Cost (OPC)	3,300	3,300	3,300	–

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs	IRA Supp. Costs
Total Project Cost (TPC)				
Prior Years	15,492	15,492	5,964	–
Prior Years - IRA Supp.	10,000	10,000	–	–
FY 2023	15,000	15,000	887	–
FY 2024	11,000	11,000	3,551	3,000
FY 2025	11,000	11,000	6,590	3,000
Outyears	27,808	27,808	63,308	4,000
Total, TPC	90,300	90,300	80,300	10,000

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	8,500	6,000	N/A
Design - Contingency	1,000	1,000	N/A
Total, Design (TEC)	9,500	7,000	N/A
Construction	62,000	63,000	N/A
Construction - Contingency	15,500	17,000	N/A
Total, Construction (TEC)	77,500	80,000	N/A
Total, TEC	87,000	87,000	N/A
<i>Contingency, TEC</i>	<i>16,500</i>	<i>18,000</i>	<i>N/A</i>
Other Project Cost (OPC)			
Conceptual Planning	2,700	2,700	N/A
Conceptual Design	600	600	N/A
Total, Except D&D (OPC)	3,300	3,300	N/A
Total, OPC	3,300	3,300	N/A

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Contingency, OPC	N/A	N/A	N/A
Total, TPC	90,300	90,300	N/A
Total, Contingency (TEC+OPC)	16,500	18,000	N/A

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2023	FY 2024	FY 2025	Outyears	Total
FY 2024	TEC	24,000	15,000	11,000	—	37,000	87,000
	OPC	1,492	600	—	—	1,208	3,300
	TPC	25,492	15,600	11,000	—	38,208	90,300
FY 2025	TEC	24,000	15,000	11,000	11,000	26,000	87,000
	OPC	1,492	—	—	—	1,808	3,300
	TPC	25,492	15,000	11,000	11,000	27,808	90,300

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	2Q FY 2031
Expected Useful Life	50 years
Expected Future Start of D&D of this capital asset	N/A

Related Funding Requirements (dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	288	288	14,400	14,400
Utilities	432	432	21,600	21,600
Maintenance and Repair	1,008	1,008	50,400	50,400
Total, Operations and Maintenance	1,728	1,728	86,400	86,400

7. D&D Information

The new area being constructed in this project is not replacing existing facilities.

	Square Feet
New area being constructed by this project at TJNAF	up to 47,000
Area of D&D in this project at TJNAF	None
Area at TJNAF to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None ^c
Area of D&D in this project at other sites	None
Area at other sites to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None
Total area eliminated	None

8. Acquisition Approach

The TJNAF Management and Operating (M&O) contractor, Jefferson Science Associates, will perform the acquisition for this Design-Bid-Build project, overseen by the Thomas Jefferson Site Office. The M&O contractor will be responsible for awarding and administering all subcontracts related to this project. Its annual performance evaluation and measurement plan will include project performance metrics on which it will be evaluated.

^c With the implementation of OMB's Reduce the Footprint initiative, DOE no longer maintains the space bank. Footprint is managed using the Facility Information Management System, with decisions on additions and offsets made in accordance with the DOE Real Property Efficiency Plan.

20-SC-77, Argonne Utilities Upgrade, ANL
Argonne National Laboratory, ANL
Project is for Design and Construction

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2025 Request for the Argonne Utilities Upgrade (AU2) project is \$3,000,000 of Total Estimated Cost (TEC) funding. The preliminary TEC range for this project is \$172,000,000 to \$290,250,000. The preliminary Total Project Cost (TPC) range for this project is \$173,000,000 to \$291,250,000. Currently, these cost ranges encompass the most feasible preliminary alternatives. The preliminary TPC estimate for this project is \$216,000,000.

AU2 is proposed to revitalize and selectively upgrade ANL's existing major utility systems including steam, water, sanitary sewer, chilled water, and electrical systems.

The most recent DOE Order 413.3B Critical Decision (CD) is CD-3A, Approve Site Preparation, which was approved on September 14, 2023.

A Federal Project Director working towards the appropriate certification level was assigned to this project.

Significant Changes

This Construction Project Data Sheet (CPDS) is an update to the FY 2024 CPDS and does not include a new start for FY 2025. FY 2025 funds will support design and preparatory construction activities.

Preliminary plans for the generation of steam included a new boiler fueled by natural gas, with potential to convert to hydrogen if it became viable. However, to avoid enduring dependence on fossil fuel, existing boilers will be enhanced until a carbon free electricity solution is determined.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
AU2 - Overall, ANL	5/17/19	10/30/20	7/1/21	2Q FY 2030	1Q FY 2030	2Q FY 2030	4Q FY 2034
AU2 - Chilled Water Plant , ANL	–	–	–	2Q FY 2026	1Q FY 2026	2Q FY 2027	4Q FY 2030
AU2 - Steam Plant and Utility Piping, ANL	–	–	–	2Q FY 2030	1Q FY 2030	2Q FY 2030	4Q FY 2034

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve Alternative Selection and Cost Range; **CD-2** – Approve Performance Baseline; **Final Design Complete** – Estimated/Actual date the project design will be/was complete(d); **CD-3** – Approve Start of Construction; **D&D Complete** – Completion of D&D work; **CD-4** – Approve Start of Operations or Project Closeout.

	Performance Baseline Validation	CD-3A
AU2 - Overall, ANL	3Q FY 2024	N/A
AU2 - Chilled Water Plant , ANL	2Q FY 2026	9/14/23

	Performance Baseline Validation	CD-3A
AU2 - Steam Plant and Utility Piping, ANL	2Q FY 2030	N/A

CD-3A – Long Lead Procurements and Site Preparation Activities.

Project Cost History

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2024	37,500	177,500	215,000	1,000	1,000	216,000
FY 2025	45,500	169,500	215,000	1,000	1,000	216,000

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

2. Project Scope and Justification

Scope

The preliminary scope of the AU2 project includes upgrading failing 1940s-era utilities across the ANL campus. These utilities include steam, water, sanitary sewer, chilled water, and electrical systems. To facilitate its execution, the AU2 project is comprised of two subprojects consisting of scope needed to achieve complete and usable assets. Subproject 1 (SP-1) is Chilled Water and Utility Piping: consists of site preparation and demolition via approval of CD-3A followed by construction of a new chilled water plant when CD-3 is authorized. Subproject 2 (SP-2) is Steam and Utility Piping: consists of construction modernization and enhancement of an existing boiler, replacement, and modernization of several major utility systems, including steam and condensate, domestic water, canal water and sewer systems.

Justification

An efficient, maintainable, and reliable infrastructure is critical to the success and mission capability of ANL's research facilities. Revitalizing and upgrading the near century old major utility systems—including steam, water, sanitary sewer, chilled water, and electrical systems—is a mission need for ANL to overcome current limitations in meeting modern demands. For example, steam is a critical infrastructure for Argonne facilities; the Advanced Photon Source (APS) is dependent on the steam utility for holding extremely tight temperature and humidity ranges required for beam line operations and stability. Improving the performance and resilience of utilities would not only allow major pieces of scientific equipment to operate more efficiently and effectively with modern engineered controls but also prevent catastrophic climate related damage to both buildings and equipment.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

Key Performance Parameters (KPPs)

The KPPs are preliminary and may change as the project continues towards CD-2. At CD-2 approval, the KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
Chilled Water and Utility Piping (Cooling Systems)	<ul style="list-style-type: none"> Construct a new 6,300 ton chilled water plant with N+1 reliability Repair, replace or construct new distribution piping for 5,000 linear feet of utility piping 	<ul style="list-style-type: none"> Upgrade equipment and controls at the 371, 450, and 528 chilled water plants. Repair fire domestic water tanks. Potential capacity upgrades, new equipment, equipment replacements, and various other utility system reliability projects to increase reliability of laboratory internal utilities.
Steam and Utility Piping (Steam & Condensate, Water Supply, Sewer)	<ul style="list-style-type: none"> Modernize and enhance one (1) existing boiler in Building 108 Repair, replace or construct new distribution piping for 2,500 linear feet of utility piping 	<ul style="list-style-type: none"> Modernize and enhance existing one to three additional boilers in Building 108. Repair, replace or construct new distribution piping for up to 15,000 linear feet of utility piping and support structures (e.g., vaults, pipe supports, valves, culverts, etc.). Install between 50 and 250 new smart meters.

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
Design (TEC)			
Prior Years	11,000	11,000	4,086
FY 2023	8,000	8,000	3,149
FY 2024	6,000	6,000	14,800
FY 2025	—	—	5,000
Outyears	20,500	20,500	18,465
Total, Design (TEC)	45,500	45,500	45,500
Construction (TEC)			
FY 2024	2,007	2,007	—
FY 2025	3,000	3,000	—
Outyears	164,493	164,493	169,500
Total, Construction (TEC)	169,500	169,500	169,500
Total Estimated Cost (TEC)			
Prior Years	11,000	11,000	4,086
FY 2023	8,000	8,000	3,149
FY 2024	8,007	8,007	14,800

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
FY 2025	3,000	3,000	5,000
Outyears	184,993	184,993	187,965
Total, Total Estimated Cost (TEC)	215,000	215,000	215,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
Prior Years	1,000	1,000	1,000
Total, Other Project Cost (OPC)	1,000	1,000	1,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Project Cost (TPC)			
Prior Years	12,000	12,000	5,086
FY 2023	8,000	8,000	3,149
FY 2024	8,007	8,007	14,800
FY 2025	3,000	3,000	5,000
Outyears	184,993	184,993	187,965
Total, TPC	216,000	216,000	216,000

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	36,400	30,000	N/A
Design - Contingency	9,100	7,500	N/A
Total, Design (TEC)	45,500	37,500	N/A
Construction	135,600	142,000	N/A
Construction - Contingency	33,900	35,500	N/A
Total, Construction (TEC)	169,500	177,500	N/A

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total, TEC	215,000	215,000	N/A
<i>Contingency, TEC</i>	<i>43,000</i>	<i>43,000</i>	<i>N/A</i>
Other Project Cost (OPC)			
Conceptual Planning	1,000	1,000	N/A
Total, Except D&D (OPC)	1,000	1,000	N/A
Total, OPC	1,000	1,000	N/A
<i>Contingency, OPC</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
Total, TPC	216,000	216,000	N/A
Total, Contingency (TEC+OPC)	43,000	43,000	N/A

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2023	FY 2024	FY 2025	Outyears	Total
FY 2024	TEC	11,000	8,000	8,007	—	187,993	215,000
	OPC	1,000	—	—	—	—	1,000
	TPC	12,000	8,000	8,007	—	187,993	216,000
FY 2025	TEC	11,000	8,000	8,007	3,000	184,993	215,000
	OPC	1,000	—	—	—	—	1,000
	TPC	12,000	8,000	8,007	3,000	184,993	216,000

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	SP-1: 4Q FY 2030 SP2: 4Q FY 2034
Expected Useful Life	50 years
Expected Future Start of D&D of this capital asset	SP-1: 4Q FY 2080 SP-2: 4Q FY 2084

Related Funding Requirements
(dollars in thousands)

	Annual Costs		Life Cycle Costs ^d	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	2,955	2,955	147,750	147,750
Utilities	4,423	4,423	221,150	221,150
Maintenance and Repair	739	739	36,950	36,950
Total, Operations and Maintenance	8,117	8,117	405,850	405,850

7. D&D Information

The new area being constructed in this project is not replacing existing facilities.

	Square Feet
New area being constructed by this project at ANL.....	None
Area of D&D in this project at ANL.....	None
Area at ANL to be transferred, sold, and/or D&D outside the project, including area previously “banked”	None ^e
Area of D&D in this project at other sites	None
Area at other sites to be transferred, sold, and/or D&D outside the project, including area previously “banked”	None
Total area eliminated	None

8. Acquisition Approach

The ANL Management and Operating (M&O) Contractor, UChicago Argonne, LLC, will perform the acquisition for this project, overseen by the Argonne Site Office. The M&O contractor is responsible for awarding and managing all subcontracts related to this project. Project performance metrics will be performed by in-house management and Project Controls.

^d Life-Cycle costs will be performed as part of CD-1.

^e With the implementation of OMB’s Reduce the Footprint initiative, DOE no longer maintains the space bank. Footprint is managed using the Facility Information Management System, with the decisions on additions and offsets made in accordance with the DOE Real Property Efficiency Plan.

20-SC-78, Linear Assets Modernization Project, LBNL
Lawrence Berkeley National Laboratory, LBNL
Project is for Design and Construction

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2025 Request for the Linear Assets Modernization Project (LAMP) is \$30,000,000 of Total Estimated Cost (TEC) funding. The preliminary TEC range for this project is \$164,000,000 to \$376,000,000. The preliminary Total Project Cost (TPC) range for this project is \$170,000,000 to \$386,000,000. Currently, these cost ranges encompass the most feasible preliminary alternatives. The preliminary TPC estimate for this project is \$242,000,000.

LAMP will upgrade high priority utility systems to increase the reliability, capability, resilience, and safety of LBNL's infrastructure to meet DOE's mission. The project will upgrade utility systems, including, but not limited to, domestic water, natural gas, storm drain, sanitary sewer, electrical, and communication.

The most recent DOE Order 413.3B Critical Decision (CD) for LAMP, CD-1, Approve Alternative Selection and Cost Range, was for the entire project and was approved on April 13, 2022.

A Level 2 Federal Project Director, working towards the appropriate certification level, was assigned to this project at CD-1.

Significant Changes

This Construction Project Data Sheet (CPDS) is an update to the FY 2024 CPDS and is not a new start for FY2025. FY 2025 funds will support the activities of the design-build contractor after the appropriate CD approval.

Critical Milestone History

20-SC-78 Linear Assets Modernization Project, LBNL

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
LAMP - Overall, LBNL	5/17/19	4/13/22	4/13/22	2Q FY 2027	2Q FY 2027	2Q FY 2027	4Q FY 2031
LAMP - Grizzly Sub - Lawrence Corridor, LBNL	–	–	–	3Q FY 2026	2Q FY 2026	3Q FY 2026	3Q FY 2029
LAMP - McMillan and East Canyon Corridors, LBNL	–	–	–	2Q FY 2027	2Q FY 2027	2Q FY 2027	4Q FY 2031

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve Alternative Selection and Cost Range; **CD-2** – Approve Performance Baseline; **Final Design Complete** – Estimated/Actual date the project design will be/was complete(d); **CD-3** – Approve Start of Construction; **D&D Complete** – Completion of D&D work; **CD-4** – Approve Start of Operations or Project Closeout.

20-SC-78 Linear Assets Modernization Project, LBNL

	Performance Baseline Validation	CD-3A
LAMP - Overall, LBNL	2Q FY 2027	1Q FY 2026
LAMP - Grizzly Sub - Lawrence Corridor, LBNL	3Q FY 2026	1Q FY 2026
LAMP - McMillan and East Canyon Corridors, LBNL	2Q FY 2027	—

CD-3A – Approve Long-Lead Procurements and Site Preparation Activities.

Project Cost History

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2024	50,000	186,000	236,000	6,000	6,000	242,000
FY 2025	50,000	186,000	236,000	6,000	6,000	242,000

Notes:

- *This project has not received CD-2 approval; therefore, funding estimates are preliminary.*
- *Other Project Costs (OPC) are funded through laboratory overhead.*

2. Project Scope and Justification

Scope

LAMP will upgrade the highest priority utility systems to increase the reliability, capability, and safety of LBNL's infrastructure to meet the DOE's mission. The utility systems include, but are not limited to, domestic water, natural gas, storm drain, sanitary sewer, electrical, and communication.

The project will aim to upgrade the most critical utility components considering operational risk and efficiencies, redundancy, utility bundling, and capacity needed for strategic growth including expanding the primary switching substation at Grizzly Peak to power the NERSC to full capacity and meet future lab power needs. LAMP will implement a multi-system approach for the renewal and improvement of LBNL's utility assets, considering geographical limitations as well as potential synergies with nearby sustainment and improvement projects, that provide opportunities for enhancement.

To facilitate its execution, LAMP is comprised of two subprojects that individually achieve complete and usable assets. The Grizzly Substation/Lawrence Corridor Subproject will increase the Lab's primary electrical substation capacity by installing new switch stations and systems capable of supporting all existing and future lab loads, distributing power for advanced supercomputing needs (NERSC), and upgrading multiple utility systems including IT/communications, natural gas, compressed air, sanitary sewer, and storm drain/hydraugers, providing for overall increased reliability and ease of maintenance. The East Canyon-McMillan Subproject will establish common utility corridors for high voltage duct banks which will segregate lines and upgrade multiple utility systems, including IT/communication, natural gas, compressed air, domestic water, sanitary sewer, and storm drain/ hydraugers providing for overall increased reliability and ease of maintenance.

Justification

SC uses the capabilities of LBNL to execute 23 of the 24 core capabilities and the mission of multiple SC program offices, including ASCR, BER, BES, and HEP. The SC mission and multiple scientific programs require increased reliability, capability, and safety of LBNL's utility infrastructure. Utility infrastructure represents almost half of LBNL's large, deferred maintenance backlog and represents a significant capability gap in LBNL's ability to provide reliable and safe services to meet DOE's mission needs. Existing infrastructure is insufficient to support planned facility modernization and growth. Without a modern utility infrastructure backbone, future growth of the science mission at LBNL may not be achievable. For these reasons, direct infrastructure investment is necessary to address deferred maintenance reduction, restore operational reliability, increase resiliency, and provide the backbone necessary for scientific advancements.

LBNL has begun measures to strengthen the laboratory's resilience to outages due to planned safety outages or natural phenomena such as earthquakes, wildfires, and extreme weather.

LAMP will deliver modern and resilient general-purpose infrastructure which will be more efficient and sustainable. For example, the underground utility corridors will not only be upgraded to the best available technology but will be designed to be maintainable and monitored using artificial intelligence to enable predictive maintenance. The first sub-project of the LAMP project will enable an optimized NERSC-10 upgrade which will play a central role in breakthrough science.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

Key Performance Parameters (KPPs)

The KPPs are preliminary and may change as the project continues towards CD-2. At CD-2 approval, the KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
Storm Drainage System, Hydrauger/ Slope Stability	Install 1,000 Linear Feet of hydraugers.	Install up to 2,500 Linear Feet of hydraugers. (Lawrence Corridor).
		Install up to 3,000 Linear Feet of hydraugers. (East Canyon/McMillan Corridor).
Sanitary Sewer	Install 150 Linear Feet of pipe.	Install up to 2,500 Linear Feet of pipe. (Lawrence Corridor).
		Install up to 3,500 Linear Feet of pipe. (McMillan Corridor).
		Install up to 1,000 Linear Feet of pipe along the electrical distribution loop corridors. (McMillan Corridor).
High Pressure City Water	Install 1,500 Linear Feet of pipe.	Install up to 3,500 Linear Feet of pipe. (East Canyon Corridor).
		Install up to 2,000 Linear Feet of pipe along the electrical distribution loop corridors. (McMillan Corridor).
Communications & Data	Install 2,600 Linear Feet of ductbank.	Install up to 4,000 Linear Feet of ductbank with manholes and cables. (Lawrence Corridor).
		Install up to 2,500 Linear Feet of ductbank with manholes and cables. (East Canyon Corridor).
		Install up to 1,500 Linear Feet of ductbank with manholes and cables along the electrical distribution loop corridors. (East Canyon Corridor).
		Install up to 1,500 Linear Feet of ductbank with manholes and cables. (McMillan Corridor).

Performance Measure	Threshold	Objective
		Install up to 5,000 Linear Feet of ductbank with manholes and cables along the electrical distribution loop corridors. (McMillan Corridor).
Electrical Distribution/Grizzly Substation	Expand the Grizzly Substation to 70 MW capacity.	Expand the Grizzly Substation up to 150 MW capacity with two redundant lines with SCADA for new equipment.
		Provide a new SCADA Control Building.
		Provide two remote SCADA Control Rooms.
		Provide SCADA remote control and monitoring of existing and new circuit breakers.
		Install up to 400 Linear Feet of electrical feeders segregating lines 1 and 2 for SW-A1.
		Install SCADA for existing 115kV equipment.
Electrical Distribution/Grizzly Substation (Con't)	Install 1,500 Linear Feet of electrical feeders segregating lines 1 and 2. (Lawrence Corridor).	Install up to 3,500 Linear Feet of electrical feeders segregating lines 1 and 2.
		Feed B59 (NERSC) with up to 80 MW of electrical power with 3,500 Linear Feet of redundant and segregated lines.
		Install up to 2,000 Linear Feet of electrical feeders and Pad Mounted Switches for electrical distribution loops, segregating lines 1 and 2.
		Provide SCADA remote control and monitoring of existing and new circuit breakers.
	Install 1,200 Linear Feet of electrical feeders segregating lines 1 and 2. (East Canyon/McMillan Corridor).	Install up to 2,600 Linear Feet of electrical feeders segregating lines 1 and 2. (East Canyon Corridor).
		Install up to 5,700 Linear Feet of electrical feeders and Pad Mounted Switches for electrical distribution loops, segregating lines 1 and 2. (East Canyon Corridor).
		Provide SCADA remote control and monitoring of existing and new circuit breakers. (East Canyon Corridor).
	Install 1,200 Linear Feet of electrical feeders segregating lines 1 and 2. (East Canyon/McMillan Corridor) (Con't).	Install up to 2,200 Linear Feet of electrical feeders segregating lines 1 and 2. (McMillan Corridor).
		Install up to 6,300 Linear Feet of electrical feeders and Pad Mounted Switches for electrical distribution loops, segregating lines 1 and 2. (McMillan Corridor).
		Provide SCADA remote control and monitoring of existing and new circuit breakers. (McMillan Corridor).
Natural Gas	Install 200 Linear Feet of pipe.	Install up to 1,000 Linear Feet of pipe. (Lawrence Corridor).
		Install up to 2,500 Linear Feet of pipe. (McMillan Corridor).
		Install up to 2,000 Linear Feet of pipe along the electrical distribution loop corridors. (McMillan Corridor).
Compressed Air	Not Applicable	Install up to 3,500 Linear Feet of pipe. (Lawrence Corridor).
		Install up to 3,500 Linear Feet of pipe. (East Canyon Corridor).
		Install up to 2,500 Linear Feet of pipe. (McMillan Corridor).
		Install up to 1,500 Linear Feet of pipe along the electrical distribution loop corridors. (McMillan Corridor).

Performance Measure	Threshold	Objective
Controls/Artificial Intelligence	Not Applicable	Install up to 40 Smart Meters for new wet utility construction. (Lawrence Corridor).
		Provide integration with SCADA. (Lawrence Corridor).
		Provide integration with Microgrid enhancement. (Lawrence Corridor).
		Install up to 60 Smart Meters for new wet utility construction. (East Canyon Corridor).
		Install up to 50 Smart Meters for new wet utility construction. (McMillan Corridor).
		Provide integration with SCADA. (East Canyon/McMillan Corridors).
		Provide integration with Microgrid enhancement. (East Canyon/McMillan Corridors).

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
Design (TEC)			
Prior Years	11,400	11,400	5,936
FY 2023	22,600	22,600	4,504
FY 2024	—	—	5,000
FY 2025	—	—	12,000
Outyears	16,000	16,000	22,560
Total, Design (TEC)	50,000	50,000	50,000
Construction (TEC)			
FY 2023	825	825	—
FY 2024	18,900	18,900	—
FY 2025	30,000	30,000	—
Outyears	136,275	136,275	186,000
Total, Construction (TEC)	186,000	186,000	186,000
Total Estimated Cost (TEC)			
Prior Years	11,400	11,400	5,936
FY 2023	23,425	23,425	4,504
FY 2024	18,900	18,900	5,000
FY 2025	30,000	30,000	12,000
Outyears	152,275	152,275	208,560
Total, Total Estimated Cost (TEC)	236,000	236,000	236,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
Prior Years	3,263	3,263	3,263
Outyears	2,737	2,737	2,737
Total, Other Project Cost (OPC)	6,000	6,000	6,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Project Cost (TPC)			
Prior Years	14,663	14,663	9,199
FY 2023	23,425	23,425	4,504
FY 2024	18,900	18,900	5,000
FY 2025	30,000	30,000	12,000
Outyears	155,012	155,012	211,297
Total, TPC	242,000	242,000	242,000

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	38,500	38,500	N/A
Design - Contingency	11,500	11,500	N/A
Total, Design (TEC)	50,000	50,000	N/A
Construction	144,000	144,000	N/A
Construction - Contingency	42,000	42,000	N/A
Total, Construction (TEC)	186,000	186,000	N/A
Total, TEC	236,000	236,000	N/A
<i>Contingency, TEC</i>	<i>53,500</i>	<i>53,500</i>	<i>N/A</i>
Other Project Cost (OPC)			
Conceptual Design	2,610	2,610	N/A
Start-up	2,190	2,190	N/A
OPC - Contingency	1,200	1,200	N/A
Total, Except D&D (OPC)	6,000	6,000	N/A
Total, OPC	6,000	6,000	N/A
<i>Contingency, OPC</i>	<i>1,200</i>	<i>1,200</i>	<i>N/A</i>

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total, TPC	242,000	242,000	N/A
Total, Contingency (TEC+OPC)	54,700	54,700	N/A

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2023	FY 2024	FY 2025	Outyears	Total
FY 2024	TEC	11,400	23,425	18,900	—	182,275	236,000
	OPC	3,263	—	—	—	2,737	6,000
	TPC	14,663	23,425	18,900	—	185,012	242,000
FY 2025	TEC	11,400	23,425	18,900	30,000	152,275	236,000
	OPC	3,263	—	—	—	2,737	6,000
	TPC	14,663	23,425	18,900	30,000	155,012	242,000

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	4Q FY 2031
Expected Useful Life	50 years
Expected Future Start of D&D of this capital asset	N/A

Related Funding Requirements

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	1,200	1,200	60,000	60,000
Utilities	12	12	600	600
Maintenance and Repair	3,000	3,000	150,000	150,000
Total, Operations and Maintenance	4,212	4,212	210,600	210,600

7. D&D Information

This project replaces critical infrastructure components; no new construction area is anticipated to be constructed in this project and it will not replace existing facilities.

	Square Feet
New area being constructed by this project at LBNL	None
Area of D&D in this project at LBNL	None
Area at LBNL to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None ^f
Area of D&D in this project at other sites	None
Area at other sites to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None
Total area eliminated	None

8. Acquisition Approach

The LBNL Management and Operating (M&O) Contractor, University of California will perform the acquisition for this project, overseen by the Berkeley Site Office. The M&O contractor is responsible for awarding and managing all subcontracts related to this project. Project performance metrics will be performed by in-house management and Project Controls.

^f With the implementation of OMB's Reduce the Footprint initiative, DOE no longer maintains the space bank. Footprint is managed using the Facility Information Management System, with the decisions on additions and offsets made in accordance with the DOE Real Property Efficiency Plan.

20-SC-79, Critical Utilities Infrastructure Revitalization, SLAC
SLAC National Accelerator Laboratory, SLAC
Project is for Design and Construction

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2025 Request for the Critical Utilities Infrastructure Revitalization (CUIR) project is \$20,000,000 of Total Estimated Cost (TEC) funding. The preliminary Total Estimated Cost (TEC) range for this project is \$160,000,000 to \$306,000,000. The preliminary Total Project Cost (TPC) range for this project is \$164,500,000 to \$310,500,000. Currently, these cost ranges encompass the most feasible preliminary alternatives. The preliminary TPC estimate for this project is \$208,500,000.

The primary objective of this project is to close utilities infrastructure gaps, such as utility piping breaks, power fluctuations, faults, and cooling water interruptions, to support multi-program science missions at SLAC. Evolving technologies, instruments, experimental parameters, sensitivities, and complexity require increased reliability, resiliency, and service levels in electrical, mechanical, and civil systems site wide. The CUIR project will address the critical campus-wide utility and infrastructure issues by replacing, repairing, and modernizing the highest risk water/fire protection, sanitary sewer, storm drain, electrical, and cooling water system deficiencies. These needs have been identified through condition assessments, inspections, and recommendations from subject matter experts responsible for stewardship of the systems.

This project was initiated in FY 2020 Enacted Appropriations. The most recent DOE Order 413.3B approved Critical Decision (CD) is CD-3A, Approve Long-Lead Procurement and Early Site Preparation, which was approved on May 8, 2023.

A Federal Project Director working towards the appropriate certification level was assigned to this project.

Significant Changes

This Construction Project Data Sheet (CPDS) is an update to the FY 2024 CPDS and does not include a new start for FY 2025. FY 2025 funds will support construction activities after the appropriate CD approvals.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
CUIR - Overall, SLAC	5/17/19	4/15/21	1/21/22	3Q FY 2029	1Q FY 2029	3Q FY 2029	1Q FY 2035
CUIR - Critical Electrical Work, SLAC	–	–	–	4Q FY 2025	2Q FY 2025	4Q FY 2025	4Q FY 2027
CUIR - Linac Utilities and Equipment, SLAC	–	–	–	4Q FY 2026	2Q FY 2026	4Q FY 2025	4Q FY 2030
CUIR - Sitewide Utilities, SLAC	–	–	–	3Q FY 2029	1Q FY 2029	3Q FY 2029	1Q FY 2035

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve Alternative Selection and Cost Range; **CD-2** – Approve Performance Baseline; **Final Design Complete** – Estimated/Actual date the project design will be/was complete(d); **CD-3** – Approve Start of Construction; **D&D Complete** – Completion of D&D work; **CD-4** – Approve Start of Operations or Project Closeout.

	Performance Baseline Validation	CD-3A
CUIR - Overall, SLAC	3Q FY 2029	5/8/23
CUIR - Critical Electrical Work, SLAC	–	5/8/23

CD-3A – Approve Long-Lead Procurements and Site Preparation Activities.

Project Cost History

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2024	13,000	191,000	204,000	4,500	4,500	208,500
FY 2025	13,000	191,000	204,000	4,500	4,500	208,500

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

2. Project Scope and Justification

Scope

CUIR’s preliminary scope is to update major electrical gear, instrumentation, and cooling water systems for the two-mile long klystron gallery and accelerator housing constructed in 1962. Additionally, it will upgrade underground domestic water/fire protection, sanitary sewer, and storm drain systems site-wide. To facilitate its execution, CUIR is comprised of 3 subprojects to achieve complete and usable assets: Critical Electrical Work Subproject to replace and upgrade electrical components at greatest risk of failure or substandard performance of the Linac; Linac Utilities and Equipment Subproject to replace and reconfigure various electrical and mechanical equipment components and domestic/fire water piping; Sitewide Utilities Subproject to replace waveguide water heat exchangers, controls, and pumps.

Justification

SLAC is currently implementing a Campus Strategy designed to support the DOE Science Mission, increase reliability, and minimize costs through safe, effective, resilient, and efficient operations. The objective of the CUIR project is to reduce risks and close the capability gaps identified in SLAC’s infrastructure assessments and surveys as they relate to storm water, sanitary sewer, domestic water/fire protection, electrical, and cooling water systems.

Disruptions caused by power fluctuations, faults, and cooling water interruptions, and utility piping breaks have frequently impacted science research site wide. Electrical systems, pumps, and motors fail, valves on piping systems freeze, and there are inoperable or unsafe electrical components that require broad outages to respond and repair. Workarounds and administrative controls have been placed on existing equipment and systems because they are underrated, not operating as intended, or not designed/operational for today’s science needs, which results in create tremendous inefficiencies and safety concerns, and sub-optimized operations.

The CUIR project will reduce operational risks in critical infrastructure and utility support systems for all science programs and will retire \$18,000,000 in deferred maintenance. These existing reliability gaps will continue to impede the operational efficiency, reliability, productivity, and competitive viability in science programs and other related science research breakthroughs until they are filled.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

Key Performance Parameters (KPPs)

The KPPs are preliminary and may change as the project continues towards CD-2. At CD-2 approval, the KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. The Objective KPPs are shown adjacent to the applicable Threshold KPPs in the following charts. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
Subproject 1: Critical Electrical System Improvements		
	Install one (1) substation to provide 3.5MVA power *	None
	Install three (3) 12kV feeder pathways and cables *	Install eight (8) 12kV feeder pathways and cables
	Install one (1) 230kV 60MVA (or larger) transformer *	Install two (2) 230kV 65MVA transformers **
	Install one (1) medium voltage switchgear at Sector 4 to allow feeder cable selection*	None
	Install two (2) medium voltage switchgear at the MSS to allow feeder cable selection*	
	Replace monitoring equipment to provide monitoring and supervisory control input at nine (9) substation relay doors with one (1) integration hub.	Replace monitoring equipment to provide monitoring and supervisory control input at twelve (12) substation relay doors with one (1) integration hub. Integrate data from the substation, backup generator and transformer into the data-analytics platform
<i>* Electrical equipment required to deliver noted threshold scope will be acquired upon approval of CD-3A ** Electrical equipment necessary to deliver noted objective scope, which may be acquired after approval of CD-3A to provide project team adequate time to integrate objective scope into Subproject 1 outage planning and construction schedule development.</i>		
Subproject 2: Critical Civil Utilities Replacement and Upgrades		
	Replace 12,000 linear feet of domestic/fire water piping. Install submeters, flow and pressure sensors at two (2) domestic water main branches.	Replace 18,000 linear feet of domestic/fire water piping. Install submeters, flow and pressure sensors at four (4) domestic water main branches.

Performance Measure	Threshold	Objective
	Replace 2,700 linear feet of water main, laterals, and valves. Install five (5) backflow preventors and five (5) fire hydrants. Install submeter flow and pressure sensors at one (1) domestic water key node.	None
	Replace 1,000 linear feet of sanitary sewer piping. Install sensors to measure sewage flow, Total Dissolved Solids (TDS) at two (2) effluent stations.	Install sensors to measure sewage flow, Total Dissolved Solids (TDS) at five (5) existing effluent stations.
	Replace or re-line 5,000 linear feet of storm drain piping.	Replace or re-line 10,000 linear feet of storm drain piping.
	Data Analytics Plan to enhance monitoring and operation performance for utility systems.	Data Analytics Plan to integrate substation and water-cooling system monitor output into recommended data-analytics platform.
	None	Replace and reconfigure medium-voltage equipment for four (4) Variable Voltage Substations (VVS) and replace low voltage gear at five (5) substations.
	None	Replace 4,500LF of 12kV cables in PEP region.
	None	Replace low voltage sections for ten (10) K-sub, ten (10) VVS and sixteen (16) Motor Control Centers (MCC).
Subproject 3: Subproject 3: Critical Mechanical Utilities Upgrades		
	Replace eleven (11) Waveguide water heat exchangers, controls, and pumps.	None
	Replace four (4) Klystron water heat exchangers, four (4) controls, and four (4) pumps.	Replace 1,000 KF of Klystron piping system.
	Replace eleven (11) Accelerator, Klystron, and Waveguide monitoring devices.	None
	Install two (2) natural gas main meters, replace six (6) existing BTU energy meter, and integrate each into data analytics platform.	Install four (4) main meters and eight (8) submeters for natural gas, replace twelve (12) energy BTU meters and integrate each into the data analytics platform.
	None	Replace ten (10) programmable logic controller (PLC) to provide Data Analytics input.

Performance Measure	Threshold	Objective
	None	Integrate substation and water-cooling system monitor output into data-analytics platform.

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
Design (TEC)			
Prior Years	5,000	5,000	6,158
FY 2023	—	—	3,121
FY 2024	—	—	560
FY 2025	—	—	500
Outyears	8,000	8,000	2,661
Total, Design (TEC)	13,000	13,000	13,000
Construction (TEC)			
Prior Years	4,500	4,500	2,500
FY 2023	25,425	25,425	800
FY 2024	35,075	35,075	30,000
FY 2025	20,000	20,000	20,000
Outyears	106,000	106,000	137,700
Total, Construction (TEC)	191,000	191,000	191,000
Total Estimated Cost (TEC)			
Prior Years	9,500	9,500	8,658
FY 2023	25,425	25,425	3,921
FY 2024	35,075	35,075	30,560
FY 2025	20,000	20,000	20,500
Outyears	114,000	114,000	140,361
Total, Total Estimated Cost (TEC)	204,000	204,000	204,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
Prior Years	2,672	2,672	2,672
FY 2023	11	11	11

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
FY 2024	100	100	100
FY 2025	250	250	250
Outyears	1,467	1,467	1,467
Total, Other Project Cost (OPC)	4,500	4,500	4,500

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Project Cost (TPC)			
Prior Years	12,172	12,172	11,330
FY 2023	25,436	25,436	3,932
FY 2024	35,175	35,175	30,660
FY 2025	20,250	20,250	20,750
Outyears	115,467	115,467	141,828
Total, TPC	208,500	208,500	208,500

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	11,300	11,400	N/A
Design - Contingency	1,700	1,600	N/A
Total, Design (TEC)	13,000	13,000	N/A
Construction	151,000	152,000	N/A
Construction - Contingency	40,000	39,000	N/A
Total, Construction (TEC)	191,000	191,000	N/A
Total, TEC	204,000	204,000	N/A
<i>Contingency, TEC</i>	<i>41,700</i>	<i>40,600</i>	<i>N/A</i>
Other Project Cost (OPC)			
Conceptual Planning	4,500	3,200	N/A
Conceptual Design	N/A	1,300	N/A
Total, Except D&D (OPC)	4,500	4,500	N/A
Total, OPC	4,500	4,500	N/A

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Contingency, OPC	N/A	N/A	N/A
Total, TPC	208,500	208,500	N/A
Total, Contingency (TEC+OPC)	41,700	40,600	N/A

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2023	FY 2024	FY 2025	Outyears	Total
FY 2024	TEC	9,500	25,425	35,075	—	134,000	204,000
	OPC	2,672	50	—	—	1,778	4,500
	TPC	12,172	25,475	35,075	—	135,778	208,500
FY 2025	TEC	9,500	25,425	35,075	20,000	114,000	204,000
	OPC	2,672	11	100	250	1,467	4,500
	TPC	12,172	25,436	35,175	20,250	115,467	208,500

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	1Q FY 2035
Expected Useful Life	Average 30 years (based system)
Expected Future Start of D&D of this capital asset	N/A

Related Funding Requirements (dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	8,673	8,673	260,176	260,176
Utilities	10,487	10,487	314,624	314,624
Maintenance and Repair	8,461	8,461	253,833	253,833
Total, Operations and Maintenance	27,621	27,621	828,632	828,632

7. D&D Information

The new area being constructed in this project is not replacing existing facilities.

	Square Feet
New area being constructed by this project at SLAC	None
Area of D&D in this project at SLAC	None
Area at SLAC to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None ^g
Area of D&D in this project at other sites	None
Area at other sites to be transferred, sold, and/or D&D outside the project, including area previously "banked"	None
Total area eliminated	None

8. Acquisition Approach

The SLAC Management and Operating (M&O) contractor, Stanford University, will perform the acquisition for this project, overseen by the Stanford Site Office. The M&O contractor is responsible for awarding and managing all subcontracts related to this project. The M&O contractor is evaluating various acquisition alternatives and project delivery methods. Potential acquisition and project delivery methods include, but are not limited to, firm-fixed-price contracts for design-bid-build, construction management, and design-build subcontracts. The M&O contractor will also evaluate potential benefits of using single or multiple contracts to procure materials, equipment, construction, commissioning, and other project scope elements. Its annual performance and evaluation measurement plan will include project performance metrics for SLAC on which it will be evaluated.

^g With the implementation of OMB's Reduce the Footprint initiative, DOE no longer maintains the space bank. Footprint is managed using the Facility Information Management System, with decisions on additions and offsets made in accordance with the DOE Real Property Efficiency Plan.

**20-SC-80, Utilities Infrastructure Project, FNAL
Fermi National Accelerator Laboratory, FNAL
Project is for Design and Construction**

1. Summary, Significant Changes, and Schedule and Cost History

Summary

The FY 2025 Request for the Utilities Infrastructure Project (UIP) is \$45,000,000 of Total Estimated Cost (TEC) funding. The preliminary Total TEC range for this project is \$248,000,000 to \$403,000,000. The preliminary Total Project Cost (TPC) range for this project is \$252,000,000 to \$411,000,000. Currently, these cost ranges encompass the most feasible preliminary alternatives. The preliminary TPC estimate for this project is \$314,000,000.

This project will modernize and upgrade obsolete and deteriorated utilities infrastructure at Fermi National Accelerator Laboratory (FNAL) and provide resiliency, reliability, and increased safety of operations to ensure the infrastructure can continue supporting the Laboratory's scientific missions. Major elements include modernization of the existing central utility building including an expansion to provide a new chilled water capacity to support current and future chilled water capacity, hot water, and low conductivity water systems. Additionally, the Kautz Road substation will be modernized to enhance its reliability and reduce safety risks. Both the modernization of the central utility building and the electrical substation are scheduled for construction during FNAL's FY 2027–2029 Long Accelerator Shutdown. The balance of the project will revitalize aging linear utilities across the FNAL site including sanitary sewers, domestic water, industrial cooling water, natural gas, and electrical feeders and equipment is in the early planning stages.

The most recent DOE Order 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on February 23, 2022.

A Federal Project Director is working towards the appropriate certification level assigned to this project at CD-1.

Significant Changes

This Construction Project Data Sheet (CPDS) is an update to the FY 2024 CPDS and is not a new start for FY2025. FY 2025 funds will support construction activities after the appropriate CD approvals.

Critical Milestone History

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	CD-4
UIP - Overall, FNAL	5/17/19	–	2/23/22	3Q FY 2029	4Q FY 2030	3Q FY 2029	3Q FY 2034
UIP - New Chill Water Plant, Cent Utility Build Upgrades, FNAL	–	–	–	4Q FY 2025	2Q FY 2025	4Q FY 2025	4Q FY 2030
UIP - Kautz Road Substation Replacement, FNAL	–	–	–	1Q FY 2026	4Q FY 2025	1Q FY 2026	3Q FY 2030
UIP - Linear Utilities, FNAL	–	–	–	3Q FY 2029	4Q FY 2030	3Q FY 2029	3Q FY 2034

CD-0 – Approve Mission Need for a construction project with a conceptual scope and cost range; **Conceptual Design Complete** – Actual date the conceptual design was completed (if applicable); **CD-1** – Approve Alternative Selection and Cost Range; **CD-2** – Approve Performance Baseline; **Final Design Complete** – Estimated/Actual date the project design will be/was complete(d); **CD-3** – Approve Start of Construction; **D&D Complete** – Completion of D&D work; **CD-4** – Approve Start of Operations or Project Closeout.

	Performance Baseline Validation	CD-3A
UIP - Overall, FNAL	3Q FY 2029	4Q FY 2024
UIP - New Chill Water Plant, Cent Utility Build Upgrades, FNAL	4Q FY 2025	4Q FY 2024
UIP - Kautz Road Substation Replacement, FNAL	1Q FY 2026	1Q FY 2025
UIP - Linear Utilities, FNAL	TBD	TBD

CD-3A – Approve Long-Lead Procurements and Site Preparation Activities.

Project Cost History

(dollars in thousands)

Fiscal Year	TEC, Design	TEC, Construction	TEC, Total	OPC, Except D&D	OPC, Total	TPC
FY 2024	43,800	266,200	310,000	4,000	4,000	314,000
FY 2025	40,750	269,250	310,000	4,000	4,000	314,000

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

2. Project Scope and Justification

Scope

The UIP's preliminary scope includes upgrading the highest risk major utility systems across the FNAL campus. Specifically, this project will first evaluate and identify the condition and risks of failure and inadequate performance of the industrial cooling water system, potable water distribution system, sanitary sewer and storm collection systems, natural gas distribution system, electrical distribution system, Kautz Road Substation, and the Central Utility Building. Selected portions of the systems with the highest risk of impact to operations will then be replaced or upgraded to assure safe, reliable, and efficient service to mission critical facilities. As such, the project will perform upgrades to obsolete, end-of-life components, which will increase capacity, reliability, and personnel safety for critical utilities. A review and approval for long-lead procurements (e.g., mechanical, and electrical equipment) and site preparation in support of CD-3A is planned in FY 2024.

To facilitate its execution, UIP is comprised of three subprojects consisting of scope needed to achieve complete and usable assets. Subproject 1: the New Chilled Water Plant and Central Utility Plant Upgrades Subproject plans to 1) expand the existing Central Utility Building to provide chilled water capacity to support current and future loads, and 2) modernize the existing section of the Central Utility Building systems such as hot water and low conductivity water systems. Subproject 2: the Kautz Road Substation Replacement Subproject plans to enhance the reliability of the Kautz Road Substation and reduce safety risks to personnel by replacing aging infrastructure, facilitating energy control, and reducing arc-flash incident energies. The primary construction phase of Subprojects 1 and 2 need to occur during FNAL's FY 2027–2029 Long Accelerator Shutdown to minimize disruption to the accelerator complex. Subproject 3: the Linear Utilities Replacement Subproject preliminary plans to revitalize aging linear utilities across the FNAL site including sanitary sewers, domestic water, industrial cooling water, natural gas, and electrical feeders and equipment. These improvements plan to enhance system reliability and reduce deferred maintenance.

Justification

DOE's Office of Science (SC) advances new experiments, international partnerships, and research programs to transform the understanding of nature and to advance U.S. energy, economic and national security interests. This mission requires the modernization and upgrades of obsolete and severely deteriorated utilities infrastructure at FNAL. SC has identified recapitalization of FNAL's Central Utilities Building and distributed site utility infrastructure to as a priority need ensure the stewardship of SC's investments and to provide modern, world-class facilities for scientific experiments and research.

Although there has been substantial investment in recent years to modernize and construct new research facilities at FNAL, much of FNAL's utility infrastructure serving these facilities is over 50 years old, is beyond useful life and suffering from failures, decreased reliability, lack of redundancy, and limitations in capacity. As such, there is an urgent need to revitalize and selectively upgrade FNAL's existing major utility systems to ensure reliable service, meet capacity requirements, and enable readiness of facilities critical to the research mission.

The UIP will deliver modern and resilient enabling infrastructure. The project includes installation of a combination of data collection and artificial intelligent monitoring systems that adjust to trends, predict failures, and react to extreme weather events, such as automatically transferring power to minimize impacts to mission critical scientific operations. Additionally, modern utility systems will be more efficient and sustainable.

The project is being conducted in accordance with the project management requirements in DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*.

Key Performance Parameters (KPPs)

The KPPs are preliminary and may change as the project continues towards CD-2. At CD-2 approval, the KPPs will be baselined. The Threshold KPPs represent the minimum acceptable performance that the project must achieve. The Objective KPPs represent the desired project performance. Achievement of the Threshold KPPs will be a prerequisite for approval of CD-4, Project Completion.

Performance Measure	Threshold	Objective
Chilled Water Plant and CUB Upgrades	<ul style="list-style-type: none">• Construct an addition to CUB for chilled water production (5,000 tons cooling capacity)• Install conventional oil-lubricated chillers• Refurbish the existing Central Utility Building envelope• Replace mechanical infrastructure in the CUB to support the Wilson Hall footprint area• Refurbish existing boiler	<ul style="list-style-type: none">▪ Increase chilled water production to 6,000 tons cooling capacity.▪ Upgrade chillers to magnetic bearing▪ Upgrade existing CUB envelope▪ Install environmentally sustainable improvements to CUB
Kautz Road Substation	<ul style="list-style-type: none">▪ Replace/ Upgrade the KRS to improve arc flash safety requirements▪ Replace T-85 Transformer	<ul style="list-style-type: none">• Upgrade bus duct to cable busReplace and repair Main Injector feeders from KRS
Linear Utilities Replacement	<ul style="list-style-type: none">▪ Revitalize 5 miles of the Industrial Cooling Water system.	<ul style="list-style-type: none">▪ Revitalize 16 miles of the Industrial Cooling Water system.
	<ul style="list-style-type: none">▪ Revitalize 5 miles of the Domestic Water System (DWS).	<ul style="list-style-type: none">▪ Revitalize 19 miles of the Domestic Water System (DWS).
	<ul style="list-style-type: none">▪ Revitalize 3.5 miles of the Sanitary Sewer systems.	<ul style="list-style-type: none">▪ Revitalize 11 miles of the Sanitary Sewer System.

Performance Measure	Threshold	Objective
	<ul style="list-style-type: none"> Revitalize 2 miles of underground Natural Gas lines. Revitalize 2 miles of electrical distribution feeders and associated unit substations, transformers, etc. 	<ul style="list-style-type: none"> Revitalize 22 miles of underground Natural Gas lines. Revitalize 65 miles of electrical distribution feeders and associated unit substations, transformers, etc. Provide Electrical Code upgrades to Master Substation Revitalize 100 percent of the High-Pressure Sodium exterior lights along sidewalks, roads, and parking lots with LED.

3. Financial Schedule

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Estimated Cost (TEC)			
Design (TEC)			
Prior Years	11,500	11,500	870
FY 2023	11,000	11,000	3,740
FY 2024	4,300	4,300	18,355
FY 2025	—	—	4,270
Outyears	13,950	13,950	13,515
Total, Design (TEC)	40,750	40,750	40,750
Construction (TEC)			
FY 2023	9,000	9,000	—
FY 2024	40,700	40,700	18,000
FY 2025	45,000	45,000	27,900
Outyears	174,550	174,550	223,350
Total, Construction (TEC)	269,250	269,250	269,250
Total Estimated Cost (TEC)			
Prior Years	11,500	11,500	870
FY 2023	20,000	20,000	3,740
FY 2024	45,000	45,000	36,355
FY 2025	45,000	45,000	32,170
Outyears	188,500	188,500	236,865
Total, Total Estimated Cost (TEC)	310,000	310,000	310,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Other Project Cost (OPC)			
Prior Years	2,050	2,050	2,050
Outyears	1,950	1,950	1,950
Total, Other Project Cost (OPC)	4,000	4,000	4,000

(dollars in thousands)

	Budget Authority (Appropriations)	Obligations	Costs
Total Project Cost (TPC)			
Prior Years	13,550	13,550	2,920
FY 2023	20,000	20,000	3,740
FY 2024	45,000	45,000	36,355
FY 2025	45,000	45,000	32,170
Outyears	190,450	190,450	238,815
Total, TPC	314,000	314,000	314,000

4. Details of Project Cost Estimate

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design	33,500	36,100	N/A
Design - Contingency	7,250	7,700	N/A
Total, Design (TEC)	40,750	43,800	N/A
Construction	225,000	221,300	N/A
Construction - Contingency	44,250	44,900	N/A
Total, Construction (TEC)	269,250	266,200	N/A
Total, TEC	310,000	310,000	N/A
<i>Contingency, TEC</i>	<i>51,500</i>	<i>52,600</i>	<i>N/A</i>
Other Project Cost (OPC)			
Conceptual Planning	880	880	N/A
Conceptual Design	1,170	1,170	N/A
OPC - Contingency	1,950	1,950	N/A
Total, Except D&D (OPC)	4,000	4,000	N/A
Total, OPC	4,000	4,000	N/A
<i>Contingency, OPC</i>	<i>1,950</i>	<i>1,950</i>	<i>N/A</i>

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total, TPC	314,000	314,000	N/A
Total, Contingency (TEC+OPC)	53,450	54,550	N/A

5. Schedule of Appropriations Requests

(dollars in thousands)

Fiscal Year	Type	Prior Years	FY 2023	FY 2024	FY 2025	Outyears	Total
FY 2024	TEC	11,500	20,000	45,000	—	233,500	310,000
	OPC	2,050	—	—	—	1,950	4,000
	TPC	13,550	20,000	45,000	—	235,450	314,000
FY 2025	TEC	11,500	20,000	45,000	45,000	188,500	310,000
	OPC	2,050	—	—	—	1,950	4,000
	TPC	13,550	20,000	45,000	45,000	190,450	314,000

Notes:

- This project has not received CD-2 approval; therefore, funding estimates are preliminary.
- Other Project Costs (OPC) are funded through laboratory overhead.

6. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	3Q FY 2034
Expected Useful Life	30 years
Expected Future Start of D&D of this capital asset	N/A

Related Funding Requirements
(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Previous Total Estimate	Current Total Estimate	Previous Total Estimate	Current Total Estimate
Operations	287	287	8,610	8,610
Utilities	577	577	17,310	17,310
Maintenance and Repair	287	287	8,610	8,610
Total, Operations and Maintenance	1,151	1,151	34,530	34,530

7. D&D Information

The new area being constructed in this project is not replacing existing facilities.

	Square Feet
New area being constructed by this project at FNAL	10,000 – 30,000
Area of D&D in this project at FNAL	None
Area at FNAL to be transferred, sold, and/or D&D outside the project, including area previously “banked”	None ^h
Area of D&D in this project at other sites	None
Area at other sites to be transferred, sold, and/or D&D outside the project, including area previously “banked”	None
Total area eliminated	None

8. Acquisition Approach

The FNAL Management and Operating (M&O) contractor, FNAL Research Alliance LLC, will perform the acquisition for this project, overseen by the FNAL Site Office. The M&O contractor is responsible for awarding and managing all subcontracts related to this project. Project performance metrics will be performed by in-house management and Project Controls.

^h With the implementation of OMB’s Reduce the Footprint initiative, DOE no longer maintains the space bank. Footprint is managed using the Facility Information Management System, with decisions on additions and offsets made in accordance with the DOE Real Property Efficiency Plan.