

## Science Laboratories Infrastructure

### Overview

The Science Laboratories Infrastructure (SLI) program mission is to support scientific and technological innovation at the Office of Science (SC) laboratories by funding and sustaining mission-ready infrastructure and fostering safe and environmentally responsible operations. The program provides state-of-the-art facilities and infrastructure that are flexible, reliable, and sustainable in support of scientific discovery. The SLI program also funds Payments in Lieu of Taxes (PILT) to local communities around the Argonne, Brookhaven, and Oak Ridge National Laboratories.

In November 2013, the DOE Secretary chartered<sup>a</sup> the National Laboratory Operations Board (LOB) to assess facilities and general purpose infrastructure across the national laboratory complex, among other things, using common standards and an enterprise-wide approach. These enterprise-wide assessments resulted in a rigorous and consistent analysis of the condition, utilization, and functionality of the facilities and infrastructure that are the most critical to mission accomplishment. Building on these assessments, SC worked with each of its laboratories to develop comprehensive Campus Strategies, integrated into the SC Annual Laboratory Planning process. Each Campus Strategy identifies activities and infrastructure investments (e.g., line-item construction, General Plant Projects [GPPs]) required to achieve the core capabilities and scientific vision for that laboratory. SC leadership used these Campus Strategies to establish the corporate facilities and infrastructure priorities going forward.

Overall, SC invests over \$400 million dollars annually in needed maintenance, repair, and upgrades of general purpose infrastructure. These investments are from a variety of funding sources, including federal appropriations for line-item construction projects and GPPs, as well as overhead-funded investments in institutional GPP work and routine maintenance and repair. The SLI program provides two important pieces of this overall strategy—line-item construction projects and a suite of infrastructure support investments that focus on laboratory core infrastructure and operations. This budget request for SLI reflects the rigor of and output from the broader SC-wide planning activities described above.

### Highlights of the FY 2017 Budget Request

Ongoing projects that will provide new laboratory buildings, renovated facilities, and upgraded utilities are proceeding towards on-time completion within budget. While significant improvements to SC infrastructure have been made, it is important to maintain a strong level of investment and continue making improvements across the SC national laboratory complex. This request does so by providing funding for three on-going and two new line-item construction projects.

Included in this request is continued funding for the Materials Design Laboratory project at Argonne National Laboratory (ANL), the Photon Science Laboratory Building project at SLAC National Accelerator Laboratory (SLAC), and the Integrative Genomics Building project at Lawrence Berkeley National Laboratory (LBNL). New funding is requested to start the Integrated Engineering Research Center at Fermi National Accelerator Laboratory (FNAL) and the Core Facility Revitalization project at Brookhaven National Laboratory (BNL).

In addition, this request continues to focus on the Secretarial priority of addressing basic needs in core general purpose infrastructure as identified through the enterprise-wide LOB assessments. Funding requested in FY 2017 will enhance and update HVAC systems and controls at LBNL, support electrical distribution upgrades at SLAC, upgrade cryogenics infrastructure at Thomas Jefferson National Accelerator Laboratory (TJNAF), and will replace and upgrade electrical distribution systems at Ames Laboratory (AMES).

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<sup>a</sup> [http://fimsinfo.doe.gov/Downloads/Infrastructure\\_Assessment\\_Group.pdf](http://fimsinfo.doe.gov/Downloads/Infrastructure_Assessment_Group.pdf)

**Science Laboratories Infrastructure  
Funding (\$K)**

	<b>FY 2015 Enacted</b>	<b>FY 2015 Current</b>	<b>FY 2016 Enacted</b>	<b>FY 2017 Request</b>	<b>FY 2017 vs FY 2016</b>
<b>Infrastructure Support</b>	<b>13,590</b>	<b>13,590</b>	<b>44,690</b>	<b>66,549</b>	<b>+21,859</b>
<b>Construction</b>					
Integrated Engineering Research Center at FNAL (17-SC-71)	0	0	0	2,500	+2,500
Core Facility Revitalization at BNL (17-SC-73)	0	0	0	1,800	+1,800
Infrastructure and Operational Improvements at PPPL (15-SC-75)	25,000	25,000	0	0	-
Materials Design Laboratory at ANL (15-SC-76)	7,000	7,000	23,910	19,590	-4,320
Photon Science Laboratory Building at SLAC (15-SC-77)	10,000	10,000	25,000	20,000	-5,000
Integrative Genomics Building at LBNL (15-SC-78)	12,090	12,090	20,000	19,561	-439
Science and User Support Building at SLAC (12-SC-70)	11,920	11,920	0	0	-
<b>Total, Construction</b>	<b>66,010</b>	<b>66,010</b>	<b>68,910</b>	<b>63,451</b>	<b>-5,459</b>
<b>Total, Science Laboratories Infrastructure</b>	<b>79,600</b>	<b>79,600</b>	<b>113,600</b>	<b>130,000</b>	<b>+16,400</b>

**Science Laboratories Infrastructure  
Explanation of Major Changes (\$K)**

	<b>FY 2017 vs FY 2016 Enacted</b>
<b>Science Laboratories Infrastructure</b>	
<b>Infrastructure Support:</b> Funding continues to support general facility and infrastructure support at NBL, OSTI and ORISE, as well as landlord responsibilities at the Oak Ridge Reservation. Funding increases to support nuclear facilities at Oak Ridge National Laboratory (ORNL) as well as the Secretarial priority to address basic needs in core general purpose infrastructure by supporting four new GPP projects.	<b>+21,859</b>
<b>Construction:</b> Funding supports continuation of three on-going projects and the start of two new projects in FY 2017.	<b>-5,459</b>
<b>Total, Science Laboratories Infrastructure</b>	<b>+16,400</b>

## Program Accomplishments

The SLI program has invested over \$700 million in infrastructure and has successfully completed nine line item projects since FY 2006, when SC initiated the effort to modernize infrastructure across the laboratory complex. With these investments, the SLI program has constructed 875,000 gross square feet (gsf) of new space and has modernized 397,000 gsf of existing space. As a result, an estimated 2,230 laboratory users and researchers now occupy newly constructed and/or modernized buildings that better support scientific and technological innovation in a collaborative environment.

The *Research Support Building and Infrastructure Modernization project at SLAC National Accelerator Laboratory (SLAC)*. The project was designed to integrate the accelerator science, technology, and support communities across programmatic boundaries in alignment with the Laboratory's multi-program mission. The project provided 132,000 GSF of new and renovated space. The project achieved CD-4, Approve Project Completion, on April 24, 2015.

The *Science and User Support Building project at SLAC National Accelerator Laboratory (SLAC)*. Preliminary construction work, including the demolition of an existing cafeteria, commenced in September 2013. Construction of foundations was completed in June 2014 and erection of the steel frame structure began in July 2014. Beneficial Occupancy occurred in September 2015. The project is progressing ahead of schedule and within budget.

The *Utilities Infrastructure Modernization project at Thomas Jefferson National Accelerator Laboratory (TJNAF)*. The project will upgrade, expand or replace portions of the cryogenics test facility and the electrical distribution, process cooling, and communications systems. Construction of the first phase began after achieving CD-3A, Approve Start of Construction for Phase A, and concurrently with CD-2, Approve Performance Baseline, on May 21, 2014. Construction of the second phase began upon achieving CD-3B, Approve Start of Construction for Phase B, on June 30, 2014 and the third phase began upon achieving CD-3C, Approve Start of Construction of Phase C, on February 20, 2015. The project is progressing ahead of schedule and within budget. The overall project is over 60 percent complete with all electrical distribution and process cooling work nearly complete.

The *Utilities Upgrade project at Fermi National Accelerator Laboratory (FNAL)*. The project will design and construct upgraded Industrial Cooling Water and High Voltage Electrical Systems. The scope includes replacing components at or near end of service life and upgrading the distribution networks with secondary distribution and additional controls. Procurement of long lead items began after achieving CD-3A, Approve Start of Construction for Phase A, and concurrently with CD-2, Approve Performance Baseline, on February 18, 2015. Construction for the remainder of the project began upon achieving CD-3B, Approve Start of Construction for Phase B, on September 3, 2015. The project is proceeding within budget and ahead of schedule.

**Science Laboratories Infrastructure  
Infrastructure Support**

**Description**

This subprogram funds infrastructure support investments that focus on laboratory core infrastructure and operations. Investments in core infrastructure (e.g., utility systems, site-wide services, and general-purpose facilities) are an ongoing need that ensures facilities and utilities are upgraded when they approach end-of-life, systems are improved to increase reliability and performance, and excess space is removed so that it no longer requires operation and maintenance funding. Without this type of investment, SC laboratories would not be able to keep up with the pace of needed upgrades and repairs. Activities include General Plant Project upgrades at various laboratories, general infrastructure support, de-inventory of nuclear material in the New Brunswick Laboratory (NBL) at ANL, and support for the nuclear facilities at Oak Ridge National Laboratory.

This subprogram also funds Payments in Lieu of Taxes (PILT) to local communities around the Argonne, Brookhaven, and Oak Ridge National Laboratories as well as stewardship type needs (e.g., roads and grounds maintenance) across the Oak Ridge Reservation.

**Funding (\$K)**

	<b>FY 2015 Enacted</b>	<b>FY 2015 Current</b>	<b>FY 2016 Enacted</b>	<b>FY 2017 Request</b>	<b>FY 2017 vs FY 2016</b>
<b>Infrastructure Support</b>					
Facilities and Infrastructure	6,100	6,100	24,800	32,603	+7,803
Nuclear Operations	0	0	12,000	26,000	+14,000
Oak Ridge Landlord	5,777	5,777	6,177	6,182	+5
Payments in Lieu of Taxes	1,713	1,713	1,713	1,764	+51
<b>Total, Infrastructure Support</b>	<b>13,590</b>	<b>13,590</b>	<b>44,690</b>	<b>66,549</b>	<b>+21,859</b>

Facilities and Infrastructure

The Infrastructure Support subprogram funds infrastructure support investments that focus on laboratory core infrastructure and operations. In support of Secretarial priorities, SC laboratories conducted a rigorous condition assessment of their core infrastructure which validated the need for investments in these basic systems that form the backbone of their campuses. Each year, the SLI program continues this focus and collaborates with the research programs to review investment needs and select the highest priority activities to be included in the budget request. In support of this activity, plans for FY 2017 funding include projects such as enhancing the HVAC system by adding more cooling capacity for approximately 130,000 square feet of space and updating control systems. At SLAC, multiple Klystron Gallery electrical items will be replaced and other electrical distribution components throughout the site will be upgraded. At TJNAF, cryogenic infrastructure will be upgraded to ensure reliability and capacity for future mission needs. Lastly, the electrical distribution system in the Metals Development Building at AMES will be replaced and upgraded and the capacity of the electrical distribution system in Wilhelm Hall will be enhanced.

This subprogram also supports general facilities and infrastructure support at the Office of Scientific and Technical Information (OSTI) and the Oak Ridge Institute for Science and Education (ORISE), as well as de-inventory, removal, and transfer of nuclear material in the NBL on the site of ANL.

Nuclear Operations

To support critical DOE nuclear operations, this funding is provided to manage ORNL's nuclear facilities (i.e., Buildings 7920, 7930, 3525, and 3025E) to current expectations, in accordance with federal regulations and DOE Directives. This funding supports critical nuclear complex equipment and infrastructure to ensure the facilities meet mission needs and safety standards.

### Oak Ridge Landlord

Funding supports landlord responsibilities, including infrastructure for the 24,000–acre Oak Ridge Reservation and DOE facilities in the city of Oak Ridge, Tennessee. Activities include maintenance of roads, grounds, and other infrastructure; support and improvement of environmental protection, safety, and health; and PILT to Oak Ridge communities.

### Payments in Lieu of Taxes

Funding within this activity supports SC stewardship responsibilities for Payments in Lieu of Taxes (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 and operated by the Department. Under this authorization, PILT is provided to communities around the Argonne and Brookhaven National Laboratories 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.

**Science Laboratories Infrastructure  
Infrastructure Support**

**Activities and Explanation of Changes**

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
<b>Infrastructure Support \$44,690,000</b>	<b>\$66,549,000</b>	<b>+\$21,859,000</b>
<b>Facilities and Infrastructure \$24,800,000</b>	<b>\$32,603,000</b>	<b>+\$7,803,000</b>
FY 2016 funding provides general facility and infrastructure support at NBL, OSTI and ORISE as well as infrastructure investments for electrical upgrades at SLAC and ANL and renovations at FNAL.	The FY 2017 request will address top core infrastructure priorities and provide funding to enhance HVAC systems and controls at LBNL, support electrical distribution upgrades at SLAC and AMES, and upgrade the cryogenics infrastructure at TJNAF. The request also continues to support general facility and infrastructure support at OSTI and ORISE, as well as de-inventory and removal of nuclear material at NBL.	Funding increases to address basic needs in core general purpose infrastructure by supporting four new GPP projects.
<b>Nuclear Operations \$12,000,000</b>	<b>\$26,000,000</b>	<b>+\$14,000,000</b>
FY 2016 funding supports the management of ORNL's nuclear facilities to current expectations, in accordance with federal regulations and DOE Directives.	The FY 2017 request continues to support critical nuclear operations and provides funding to manage ORNL's nuclear facilities to current expectations, in accordance with federal regulations and DOE Directives.	Funding increases to support ORNL's nuclear facilities and provides funding for critical nuclear complex equipment and infrastructure needed to ensure the facilities meet mission needs and safety standards.
<b>Oak Ridge Landlord \$6,177,000</b>	<b>\$6,182,000</b>	<b>+\$5,000</b>
FY 2016 funding supports stewardship type needs across the Oak Ridge Reservation as well as PILT to Oak Ridge communities.	The FY 2017 request provides funding to support landlord responsibilities across the Oak Ridge Reservation. Activities include maintenance of roads, grounds, and other infrastructure; support and improvement of environmental protection, safety, and health; and PILT to Oak Ridge communities.	Funding increases for maintenance and other infrastructure support needs.

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
<b>Payments in Lieu of Taxes \$1,713,000</b>	<b>\$1,764,000</b>	<b>+\$51,000</b>
FY 2016 funding supports PILT payments to communities around the Argonne and Brookhaven National Laboratories.	The FY 2017 request provides funding for PILT payments to communities around the Argonne and Brookhaven National Laboratories.	Funding increases to accommodate increases in PILT requirements.

## Science Laboratories Infrastructure Construction

### Description

The SLI Construction 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 FY 2017 budget request includes funding for three ongoing projects that were new starts in FY 2015 and two new projects.

### On-Going Projects

#### Infrastructure and Operational Improvements at PPPL (15-SC-75)

The Infrastructure and Operational Improvements project will provide critical improvements to infrastructure and operations that support plasma and fusion-energy sciences research. Existing facilities and infrastructure at PPPL are marginally adequate to support cost-effective research operations. For example, many researchers and engineers are housed in buildings that were originally built in the 1960s and include obsolete and inadequate enclosure, mechanical, electrical, and plumbing systems. This project will rectify the most significant infrastructure deficiencies as part of a comprehensive campus strategic facilities investment plan being developed by PPPL. Completion of this project will result in improved operational efficiency and modernized infrastructure that is essential to support fusion energy sciences research.

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on May 11, 2015. The estimated preliminary Total Project Cost (TPC) range for this project is \$21,700,000 to \$26,000,000. This cost range and schedule will be further evaluated and may change prior to CD-2 and until the project baseline is established. No funding is requested for this project in FY 2017.

This project was a new start in FY 2015 with full funding requested and appropriated.

FY 2016 Milestones	FY 2017 Milestones	FY 2018–2021 Key Milestones
CD-2 – Approve Performance Baseline	CD-3 – Approve Start of Construction	CD-4 – Approve Project Closeout

#### Materials Design Laboratory at ANL (15-SC-76)

The Materials Design Laboratory project will support research in materials science in energy and a range of other fields. It will entail construction of a new laboratory office building at least 97,000 gross square feet (gsf) in size and located adjacent to the recently completed Energy Sciences Building. The existing research buildings at Argonne dedicated to this SC research mission are all more than 40 years old, some as old as 55 years. These structures require frequent repair, resulting in interruptions to research activities, and they are unable to meet modern standards for instruments requiring vibration, electromagnetic and/or thermal stability.

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on January 30, 2015 with a cost range of \$77,500,000 to \$96,000,000.

The FY 2017 Request for the Materials Design Laboratory Project is \$19,590,000, which is \$4,320,000 less than the FY 2016 Enacted level and consistent with the preliminary baseline funding profile. FY 2017 funds will be used for construction (e.g. site work and long lead procurements) and project management and support activities.

FY 2016 Milestones	FY 2017 Milestones	FY 2018–2021 Key Milestones
CD-2 – Approve Performance Baseline	CD-3 – Approve Start of Construction	CD-4 – Approve Project Completion

Photon Science Laboratory Building at SLAC (15-SC-77)

The Photon Science Laboratory Building project will provide centralized modern laboratory and office space to enable the development and expansion of SLAC’s photon science programs. The Photon Science Laboratory Building will support the Linac Coherent Light Source; the Stanford Synchrotron Radiation Lightsource; the Photon Ultrafast Laser Science and Engineering Institute; and the Stanford Institute for Materials and Energy Sciences.

When this project was proposed for initial funding in the FY 2015 Budget Request, the scope was to construct a facility that would provide a portion of the space that would eventually be needed on-site to support the increase in photon science users on campus. Since that time, Stanford University has designed a larger facility shell that is being constructed with University funds. This presented the Department with an opportunity to build out space in that facility for SLAC use, rather than build new. In the FY 2016 Request, the project was rescoped to provide utilities and services (e.g., elevators, stairways, building-wide mechanical/electrical/plumbing equipment) for the entire building and framing and furnishing up to 100,000 gsf in the Stanford University building. Because of space efficiencies (shared elevators, hallways, mechanical closets, etc.) gained in constructing one building versus two, the Office of Science will acquire significantly more useable space for the same funding than could be acquired under the original project proposal. Therefore, this project has been re-scoped to fund the build-out of specialized photon science laboratories and related infrastructure in the Stanford University building. This strategic approach allows DOE/SLAC to maximize the science capability by leveraging the Stanford University investment.

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on September 23, 2015. The estimated preliminary TPC range for this project is \$45,300,000 to \$57,000,000. This cost range and the project schedule will be further evaluated prior to CD-2.

The FY 2017 Request for the Photon Science Laboratory Building is \$20,000,000, which is \$5,000,000 less than the FY 2016 Enacted level and consistent with the preliminary baseline funding profile. The Request will support of construction of this project. FY 2017 funds will be used for construction (e.g. elevators and restrooms or areas that are not dependent on specific laboratory design) and project management and support activities.

FY 2016 Milestones	FY 2017 Milestones	FY 2018–2021 Key Milestones
	CD-2– Approve Performance Baseline CD-3 – Approve Start of Construction Activities	CD-4 – Approve Start of Operations or Project Closeout

Integrative Genomics Building at LBNL (15-SC-78)

The Integrative Genomics Building project will relocate a significant fraction of the research and operations currently located in commercially leased space onto the main LBNL campus. Portions of the biosciences program at LBNL are located off-site, away from the main laboratory, and dispersed across multiple locations up to 20 miles apart. Collocation of these programs will increase the synergy and efficiency of biosciences and other research at LBNL and will provide a state-of-the-art facility for biosciences research in a collaborative environment close to other key LBNL facilities and programs.

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, which was approved on February 20, 2015 with a cost range of \$81,100,000 to \$91,500,000. This cost range and the project schedule will be further evaluated prior to CD-2.

FY 2017 Request for the Integrative Genomics Building is \$19,561,000, which is \$439,000 less than the FY 2016 Enacted level and consistent with the preliminary baseline funding profile. FY 2017 funds will be used for construction (e.g. site work and long lead procurements) and project management and support activities.

FY 2016 Milestones	FY 2017 Milestones	FY 2018–2021 Key Milestones
CD-2 – Approve Performance Baseline	CD-3 – Approve Start of Construction	CD-4 – Approve Project Completion

**New Starts for FY 2017**

Integrated Engineering Research Center FNAL (17-SC-71)

The Integrated Engineering Research Center project will construct a scientific user support facility to accommodate increased collaboration and interactions among staff at Fermilab (FNAL), who will in turn be working with scientific collaborators and international partners in the design, construction, and operation of physics experiments.

In May 2014, the Particle Physics Project Prioritization Panel (P5) issued a report that included recommendations to “...develop a coherent short- and long-baseline neutrino program hosted at Fermilab,” and to “reformulate the long-baseline neutrino program as an internationally designed, coordinated, and funded program with [Fermi National Accelerator Laboratory, FNAL or Fermilab] as host.” The Office of Science (SC) and the High Energy Physics (HEP) program accepted the recommendations in the P5 report and are committed to implementing a successful program based on this new vision.

Implementing these recommendations will require significantly increased collaboration and interactions among FNAL staff, who will in turn be working with scientific collaborators and international partners in the design, construction, and operation of physics experiments. Currently, staff and their associated manufacturing, assembly, engineering, and technical facilities are scattered among three parts of the campus – the Silicon Detector Complex, the Village, and Wilson Hall, for example. As a result, they are unable to efficiently collaborate on ongoing and planned projects in support of the mission of the laboratory. The Integrated Engineering Research Center will provide FNAL with a collaborative, multi-divisional and interdisciplinary research center. This research center will close existing capability and infrastructure gaps by reducing the overall footprint of outdated facilities, and collocating engineering and associated research staff in a new or renovated facility near the central campus. This approach would complement the ongoing and planned renovations of Wilson Hall by establishing the main campus as the anchor point of the site. It would improve operational efficiency and collaboration because groups working on key projects would be in close proximity to one another. Such a facility would provide technical and engineering staff the necessary environment for interdisciplinary collaboration necessary to establish an international neutrino program and support other HEP science opportunities described in the P5 report.

The most recent DOE O 413.3B approved Critical Decision (CD) is CD-0, *Approve Mission Need*, which was approved on July 17, 2015. The estimated preliminary total project cost range for this project is \$45,000,000 to \$146,000,000. These pre-CD-1 ranges encompass all possible alternatives. A preliminary total project cost of \$87,000,000 reflects the alternative most consistent with SLI program goals and objectives because it is expected to provide a research center with the most cost effective infrastructure investment. The cost, scope, and schedule for executing the project will be determined at Critical Decision (CD)-1.

FY 2017 funding will support the start of Project Engineering and Design activities.

Preliminary Schedule

CD-0	CD-1	CD-2	CD-3	CD-4
07/17/2015	1Q FY 2017	3Q FY 2018	3Q FY 2019	4Q FY 2023

Preliminary Cost Estimates

(Dollars in Thousands)

	FY 2017 Appropriations	Total Appropriations
Design	\$2,500	\$10,000
Construction	0	\$75,000
Other Project Costs	0	\$2,000
<b>Preliminary Total Project Cost</b>	<b>\$2,500</b>	<b>\$87,000</b>

Core Facility Revitalization at BNL (17-SC-73)

A significant amount of computation and data storage is currently conducted within the Relativistic Heavy Ion Collider (RHIC) ATLAS Computing Facility (RACF) that is located on the BNL campus. The RACF directly supports RHIC research operations funded by Nuclear Physics (NP) and US-ATLAS research operations funded by High Energy Physics (HEP). The RACF also provides mid-scale computing support to other research programs funded by SC, research efforts funded by strategic partners, and computationally-intensive research that indirectly supports the broader SC mission.

The data volume generated by the RHIC experiments and ATLAS is expected to increase three to six times over the next ten years and will require proportional increases in computation and data storage capacities. Almost half of the current RACF computing and data storage facility is expected become functionally obsolete and unable to accommodate future generations of computation and data storage technologies over the next five to ten years. Therefore, the projected capability gaps in computing infrastructure are due to a combination of decreases due to degrading capacities and increases in future requirements of mid-scale computing performed by RACF. Increases in computation and data storage will drive increased requirements for space, power, and cooling of computing facilities. A mission need therefore exists to provide sufficient, mid-range computation and data storage capabilities to support to current and planned experiments using RHIC and the ATLAS detectors, and potentially other programs.

The most recent DOE O 413.3B Critical Decision (CD) is CD-0, *Approve Mission Need*, was approved on September 10, 2015. The Mission Need Statement indicates a total project cost range of \$39,000,000 to \$96,000,000. These cost ranges encompass the most feasible preliminary alternatives. The preliminary total project cost of \$64,500,000 reflects the preliminary alternative most consistent with the SLI program goals and objectives and primary research stakeholder priorities. The cost, scope, and schedule for executing the project will be determined at CD-1.

FY 2017 funds will only support Project Engineering and Design activities.

Preliminary Schedule

CD-0	CD-1	CD-2	CD-3	CD-4
09/10/2015	3Q FY 2017	3Q FY 2019	3Q FY 2020	4Q FY 2024

Preliminary Cost Estimates

(Dollars in Thousands)

	FY 2017 Appropriations	Total Appropriations
Design	\$1,800	\$6,400
Construction	0	\$57,000
Other Project Costs	0	\$1,100
<b>Preliminary Total Project Cost</b>	<b>\$1,800</b>	<b>\$64,500</b>

**Science Laboratories Infrastructure**

**Activities and Explanation of Changes**

FY 2016 Enacted	FY 2017 Request	Explanation of Changes FY 2017 vs FY 2016
<b>Construction \$68,910,000</b>	<b>\$63,451,000</b>	<b>-\$5,459,000</b>
<b>Integrated Engineering Research Center at FNAL (17-SC-71) \$0</b>	<b>\$2,500,000</b>	<b>+\$2,500,000</b>
	Funding is requested in FY 2017 to initiate Project Engineering and Design activities for the project.	Start of Project Engineering and Design activities.
<b>Core Facility Revitalization at BNL (17-SC-73) \$0</b>	<b>\$1,800,000</b>	<b>+\$1,800,000</b>
	Funding is requested in FY 2017 to initiate Project Engineering and Design activities for the project.	Start of Project Engineering and Design activities.
<b>Materials Design Laboratory at ANL (15-SC-76) \$23,910,000</b>	<b>\$19,590,000</b>	<b>-\$4,320,000</b>
FY 2016 funding initiates construction of the project.	Funding is requested in FY 2017 to support on-going construction of the project.	Continuation of construction of the project.
<b>Photon Sciences Laboratory Building at SLAC (15-SC-77) \$25,000,000</b>	<b>\$20,000,000</b>	<b>-\$5,000,000</b>
FY 2016 funding supports ongoing construction of the project.	Funding is requested in FY 2017 to support completion of construction of the project.	Completion of construction of the project. FY 2017 will be the final year of funding for this project.
<b>Integrative Genomics Building at LBNL (15-SC-78) \$20,000,000</b>	<b>\$19,561,000</b>	<b>-\$439,000</b>
FY 2016 funding supports construction of the project.	Funding is requested in FY 2017 to support on-going construction of the project.	Continuation of construction of the project.

**Science Laboratories Infrastructure  
Capital Summary (\$K)**

	<b>Total</b>	<b>Prior Years</b>	<b>FY 2015 Enacted</b>	<b>FY 2015 Current</b>	<b>FY 2016 Enacted</b>	<b>FY 2017 Request</b>	<b>FY 2017 vs FY 2016</b>
<b>Capital Operating Expense Summary</b>							
<b>General Plants Projects</b>							
ALS HVAC System Upgrade at LBNL (TEC \$9.0M)	9,000	0	0	0	0	9,000	+9,000
Electrical Distribution Upgrades at SLAC (TEC \$10.0M)	10,000	0	0	0	0	10,000	+10,000
Cryogenics Infrastructure Upgrades at TJNAF (TEC \$8.0M)	8,000	0	0	0	0	8,000	+8,000
Linac K-sub Remediation at SLAC (TEC \$9.8M)	9,800	0	0	0	9,800	0	-9,800
Wilson Hall Renovations at FNAL (TEC \$9.0M)	9,000	0	0	0	9,000	0	-9,000
Other GPP (TEC <\$5M)	n/a	n/a	800	1,000	4,500	2,900	-1,600
<b>Total, Capital Operating Expenses</b>	n/a	n/a	<b>800</b>	<b>1,000</b>	<b>23,300</b>	<b>29,900</b>	<b>+6,600</b>

**Construction Projects Summary (\$K)**

	<b>Total Project Cost(TPC)</b>	<b>Prior Years</b>	<b>FY 2015 Enacted</b>	<b>FY 2015 Current</b>	<b>FY 2016 Enacted</b>	<b>FY 2017 Request</b>	<b>FY 2017 vs FY 2016</b>
<b>Integrated Engineering Research Center at FNAL (17-SC-71)</b>							
TEC	85,000 <sup>a</sup>	0	0	0	0	2,500	+2,500
OPC <sup>b</sup>	2,000	0	500	500	500	0	-500
TPC	87,000 <sup>a</sup>	0	500	500	500	2,500	+2,000
<b>Core Facility Revitalization at BNL (17-SC-73)</b>							
TEC	63,400 <sup>a</sup>	0	0	0	0	1,800	+1,800
OPC <sup>b</sup>	1,100	0	0	0	1,100	0	-1,100
TPC	64,500 <sup>a</sup>	0	0	0	1,100	1,800	+700

<sup>a</sup> This project has not received CD-2 approval; therefore, preliminary cost estimates are shown for TEC and TPC.

<sup>b</sup> Other Project Costs shown are funded through laboratory overhead.

	Total Project Cost(TPC)	Prior Years	FY 2015 Enacted	FY 2015 Current	FY 2016 Enacted	FY 2017 Request	FY 2017 vs FY 2016
<b>Infrastructure and Operational Improvements at PPPL (15-SC-75)</b>							
TEC	25,000 <sup>a</sup>	0	25,000	25,000	0	0	0
OPC <sup>b</sup>	1,000	1,000	0	0	0	0	0
TPC	26,000 <sup>a</sup>	1,000	25,000	25,000	0	0	0
<b>Materials Design Laboratory at ANL (15-SC-76)</b>							
TEC	95,000 <sup>a</sup>	0	7,000	7,000	23,910	19,590	-4,320
OPC <sup>b</sup>	1,000	682	318	318	0	0	0
TPC	96,000 <sup>a</sup>	682	7,318	7,318	23,910	19,590	-4,320
<b>Photon Sciences Laboratory Building at SLAC (15-SC-77)</b>							
TEC	55,000 <sup>a</sup>	0	10,000	10,000	25,000	20,000	-5,000
OPC <sup>b</sup>	2,000	230	242	242	0	459	+459
TPC	57,000 <sup>a</sup>	230	10,242	10,242	25,000	20,459	-4,541
<b>Integrative Genomics Building at LBNL (15-SC-78)</b>							
TEC	90,000 <sup>a</sup>	0	12,090	12,090	20,000	19,561	-439
OPC <sup>b</sup>	1,500	1,145	355	355	0	0	0
TPC	91,500 <sup>a</sup>	1,145	12,445	12,445	20,000	19,561	-439
<b>Science and User Support Building at SLAC (12-SC-70)</b>							
TEC	64,000	52,080	11,920	11,920	0	0	0
OPC <sup>b</sup>	1,000	800	200	200	0	0	0
TPC	65,000	52,880	12,120	12,120	0	0	0
<b>Total, Construction</b>							
TEC	n/a	n/a	66,010	66,010	68,910	63,451	-5,459
OPC <sup>b</sup>	n/a	n/a	1,615	1,615	1,600	459	-1,141
TPC	n/a	n/a	67,625	67,625	70,510	63,910	-6,600

<sup>a</sup> This project has not received CD-2 approval; therefore, preliminary cost estimates are shown for TEC and TPC.

<sup>b</sup> Other Project Costs shown are funded through laboratory overhead.

**17-SC-71 Integrated Engineering Research Center  
Fermi National Accelerator Laboratory (FNAL), Batavia, Illinois  
Preliminary Information for Design**

**1. Summary**

**Summary**

This document contains preliminary information for a design and construction project requested as a new start in FY 2017. The FY 2017 Request for this new start is \$2,500,000.

The most recent DOE O 413.3B Critical Decision (CD) is CD-0, Approve Mission Need, which was approved on July 17, 2015.

The Mission Need Statement shows a Total Estimated Cost (TEC) range of \$44,000,000 to \$144,000,000 and a Total Project Cost (TPC) range of \$45,000,000 to \$146,000,000. These preliminary cost ranges encompass all preliminary alternatives. This preliminary information reflects funding for a project to design and construct new space to accommodate increased collaboration and interactions among FNAL staff. The project is intended improve the infrastructure to support to close an infrastructure capability gap which will impede the establishment of an international neutrino campus as recommended by the Particle Physics Project Prioritization Panel (P5). A TPC of \$87,000,000 reflects the preliminary alternative most consistent with the Science Laboratories Infrastructure program goals and objectives and the most cost effective infrastructure investment. The preliminary cost, scope, and schedule for executing the project will be determined at CD-1.

A Federal Project Director with the appropriate certification level will be assigned to this project prior to CD-1 approval.

FY 2017 funds will only support Project Engineering and Design activities.

**2. Critical Milestone History**

	(fiscal quarter or date)				
	CD-0	CD-1	CD-2	CD-3	CD-4
FY 2017	07/17/2015	1Q FY 2017 <sup>a</sup>	3Q FY 2018 <sup>a</sup>	3Q FY 2019 <sup>a</sup>	4Q FY 2023 <sup>a</sup>

**CD-0** – Approve Mission Need

**CD-1** – Approve Alternative Selection and Cost Range

**CD-2** – Approve Performance Baseline

**CD-3** – Approve Start of Construction

**CD-4** – Approve Project Completion

**3. Current Preliminary Project Cost Estimates**

	(dollars in thousands)				
	TEC, Design	TEC, Construction	TEC, Total	OPC <sup>b</sup>	TPC
FY 2017	10,000	75,000	85,000 <sup>a</sup>	2,000	87,000 <sup>a</sup>

<sup>a</sup> This project is pre-CD-2; schedule and funding estimates are preliminary.

<sup>b</sup> Other project costs (OPC) are funded through laboratory overhead.

#### 4. Project Scope and Justification

##### Scope

One potential approach to improving the infrastructure capability for an international neutrino campus as identified by P5 closing this capability gap is to collocate engineering and associated research staff in a new or renovated facility near the central campus. This approach would complement the ongoing and planned renovations of Wilson Hall by establishing the main campus as the anchor point of the site. It would improve operational efficiency and collaboration because groups working on key projects would be in close proximity to one another. Such a facility would provide technical and engineering staff the necessary environment for interdisciplinary collaboration necessary to establish an international neutrino program and support other High Energy Physics scientific research opportunities described in the P5 report. This project will meet the most urgent facilities and infrastructure needs by constructing new building space of at least 67,000 gross square feet.

This project has not yet received CD-1 approval; therefore the Key Performance Parameters (KPPs) are to be determined. The table below outlines preliminary KPPs.

##### Key Performance Parameters (Preliminary)

Description	Threshold Value (Minimum)	Objective Value (Maximum)
Multistory Laboratory/Office Building	67,000 gross square feet	134,000 gross square feet

##### Justification

In May 2014, the Particle Physics Project Prioritization Panel (P5) issued a report that included recommendations to “...develop a coherent short- and long-baseline neutrino program hosted at Fermilab,” and to “Reformulate the long-baseline neutrino program as an internationally designed, coordinated, and funded program with [Fermi National Accelerator Laboratory, FNAL or Fermilab] as host.”

Implementing these recommendations will require significantly increased collaboration and interactions among FNAL staff, who will in turn be working with scientific collaborators and international partners in the design, construction, and operation of physics experiments. Currently, these staff and their associated manufacturing, assembly, engineering, and technical facilities are scattered among three parts of the campus. As a result, they are unable to efficiently collaborate on ongoing and planned projects in support of the laboratory’s mission.

Co-location of these staff would improve collaboration because it would increase interactions among the various groups and reduce down-time spent traveling across the site. From an infrastructure standpoint, however, FNAL currently lacks sufficient space to do this. Continuing the previous example, groups from the three Divisions noted above total approximately 300 staff occupying more than 170,000 square feet of laboratories, technical areas, and offices in 15 buildings and trailers. In addition, many of these spaces are inadequate to accommodate current and planned scientific programs because they are obsolete (e.g., leaking roofs, inadequate HVAC systems) and do not support the configuration or specification needs of current and future technical programs.

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

## 5. Details of Preliminary Project Cost Estimate

	(dollars in thousands)		
	Total Preliminary Cost Range: Minimum Estimate	Total Preliminary Cost: Current Point Estimate	Total Preliminary Cost Range: Maximum Estimate
Total Estimated Cost (TEC)			
Design			
Design	4,141	8,000	13,553
Contingency	1,035	2,000	3,388
Total, Design	5,176	10,000	16,941
Construction			
Construction	31,059	60,000	101,647
Contingency	7,765	15,000	25,412
Total, Construction	38,824	75,000	127,059
Total, TEC <sup>a</sup>	44,000	85,000	144,000
Contingency, TEC	8,800	17,000	28,800
Other Project Cost (OPC) <sup>b</sup>			
OPC except D&D			
Conceptual Planning	250	500	500
Conceptual Design	450	900	900
Start-up	150	300	300
Contingency	150	300	300
Total, OPC	1,000	2,000	2,000
Contingency, OPC	150	300	300
Total, TPC <sup>a</sup>	45,000	87,000	146,000
Total, Contingency	8,950	17,300	29,100

## 6. Preliminary Acquisition Approach

Acquisition for this project will be performed by the Management and Operating (M&O) contractor, Fermi Research Alliance, LLC and overseen by the Fermi Site Office. Various acquisition approaches and project delivery methods will be considered prior to achieving CD-1. The M&O contractor will be responsible for all awarding and administering all subcontracts related to this project. Project performance metrics are included in the M&O contractor's annual performance evaluation and measurement plan.

<sup>a</sup> This project is pre-CD-2; schedule and funding estimates are preliminary.

<sup>b</sup> Other project costs (OPC) are funded through laboratory overhead.

**17-SC-73 Core Facility Revitalization  
Brookhaven National Laboratory (BNL), Upton, New York  
Preliminary Information for Design**

**1. Summary**

**Summary**

This document contains preliminary information for a design and construction project requested as a new start in FY 2017.

The FY 2017 Request for this new start is \$1,800,000. The most recent DOE O 413.3B Critical Decision (CD) is CD-0, Approve Mission Need, which was approved on September 10, 2015.

The Mission Need Statement indicates a Total Estimated Cost (TEC) range of \$38,000,000 to \$94,000,000 and a Total Project Cost (TPC) range of \$39,000,000 to \$96,000,000. These preliminary cost ranges encompass the most feasible preliminary alternatives. This preliminary information reflects funding for a project to provide the most urgent computation and data storage capabilities in the shortest amount of time. A TPC of \$64,500,000 reflects the preliminary alternative most consistent with the Science Laboratories Infrastructure program goals and objectives and primary research stakeholder priorities. The preliminary cost, scope, and schedule for executing the project will be determined at CD-1.

A Federal Project Director with the appropriate certification level will be assigned to this project prior to CD-1.

FY 2017 funds will only support Project Engineering and Design activities.

**2. Critical Milestone History**

		(fiscal quarter or date)				
		CD-0	CD-1	CD-2	CD-3	CD-4
FY 2017		09/10/2015	3Q FY 2017 <sup>a</sup>	3Q FY 2019 <sup>a</sup>	3Q FY 2020 <sup>a</sup>	4Q FY 2024 <sup>a</sup>

**CD-0** – Approve Mission Need

**CD-1** – Approve Alternative Selection and Cost Range

**CD-2** – Approve Performance Baseline

**CD-3** – Approve Start of Construction

**CD-4** – Approve Project Completion

**3. Current Preliminary Project Cost Estimates**

		(dollars in thousands)				
		TEC, Design	TEC, Construction	TEC, Total	OPC <sup>b</sup>	TPC
FY 2017		6,400	57,000	63,400 <sup>a</sup>	1,100	64,500 <sup>a</sup>

**4. Project Scope and Justification**

**Scope**

The Core Facility Revitalization project will provide facilities and infrastructure to enable the computational requirements of the Office of Science’s (SC) Nuclear Physics (NP) program, High Energy Physics (HEP) program, and other research programs physically conducted at Brookhaven National Laboratory (BNL) and other locations.

<sup>a</sup> This project is pre-CD-2; schedule and funding estimates are preliminary.

<sup>b</sup> Other project costs (OPC) are funded through laboratory overhead.

This project has not yet received CD-1 approval; therefore the Key Performance Parameters (KPPs) are to be determined. The table below outlines preliminary KPPs.

**Key Performance Parameters (Preliminary)**

Description	Threshold Value (Minimum)	Objective Value (Maximum)
Computational Space	39,000 gross square feet	155,000 gross square feet

**Justification**

A significant amount of computation and data storage is currently conducted within the Relativistic Heavy Ion Collider (RHIC) ATLAS Computing Facility (RACF) that is located on the BNL campus. The RACF directly supports RHIC research operations funded by NP and US-ATLAS research operations funded by HEP). The RACF also provides mid-scale computing support to other research programs funded by SC, research efforts funded by strategic partners, and computationally-intensive research that indirectly supports the broader SC mission.

The data volume generated by the RHIC experiments and ATLAS is expected to increase three to six times over the next ten years and will require proportional increases in computation and data storage capacities. Almost half of the current RACF computing and data storage facility is expected become functionally obsolete and unable to accommodate future generations of computation and data storage technologies over the next five to ten years. Therefore, the projected capability gaps in computing infrastructure are due to a combination of decreases due to degrading capacities and increases in future requirements of mid-scale computing performed by RACF. Increases in computation and data storage will drive increased requirements for space, power, and cooling of computing facilities. A mission need therefore exists to provide sufficient, mid-range computation and data storage capabilities to support to current and planned experiments using RHIC and the ATLAS detectors, and potentially other programs.

FY 2017 funds will be used for preliminary and final design and project management and support activities.

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

**5. Details of Preliminary Project Cost Estimate**

	(dollars in thousands)		
	Total Preliminary Cost Range: Minimum Estimate	Total Preliminary Cost: Current Point Estimate	Total Preliminary Cost Range: Maximum Estimate
Total Estimated Cost (TEC)			
Design			
Design	3,069	5,120	7,591
Contingency	767	1,280	1,898
Total, Design	3,836	6,400	9,489
Construction			
Construction	25,623	42,750	63,383
Contingency	8,541	14,250	21,128
Total, Construction	34,164	57,000	84,511
Total, TEC <sup>a</sup>	38,000	63,400	94,000
Contingency, TEC	9,308	15,530	23,026

<sup>a</sup> This project is pre-CD-2; schedule and funding estimates are preliminary.

(dollars in thousands)

	Total Preliminary Cost Range: Minimum Estimate	Total Preliminary Cost: Current Point Estimate	Total Preliminary Cost Range: Maximum Estimate
Other Project Cost (OPC) <sup>a</sup>			
OPC except D&D			
Conceptual Planning	273	300	545
Conceptual Design	636	700	1,273
Contingency	91	100	182
Total, OPC	1,000	1,100	2,000
Contingency, OPC	91	100	182
Total, TPC <sup>b</sup>	39,000	64,500	96,000
Total, Contingency	9,399	15,630	23,208

## 6. Preliminary Acquisition Approach

Acquisition for this project will be performed by the BNL Management and Operating (M&O) Contractor, Brookhaven Science Associates. The M&O Contractor will be responsible for awarding and managing all subcontracts related to the project. The Brookhaven Site Office will be responsible for overseeing the performance of the M&O Contractor. Various acquisition and project delivery methods will be evaluated prior to achieving CD-1. The M&O Contractor will evaluate potential benefits of using a single or multiple contracts to procure materials, equipment, construction, commissioning and other project scope elements. Project performance metrics will be included in the M&O Contractor's annual performance and evaluation measurement plan.

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<sup>a</sup> Other project costs (OPC) are funded through laboratory overhead.

<sup>b</sup> This project is pre-CD-2; schedule and funding estimates are preliminary.

**15-SC-76 Materials Design Laboratory  
Argonne National Laboratory (ANL), Argonne, IL  
Project is for Design and Construction**

**1. Significant Changes and Summary**

**Significant Changes**

This Construction Project Data Sheet (CPDS) is an update of the FY 2016 CPDS and does not include a new start for FY 2017.

**Summary**

The FY 2017 Request for the Materials Design Laboratory is \$19,590,000, which is \$4,320,000 less than the FY 2016 Enacted level and consistent with the approved baseline funding profile. The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, and was approved on January 30, 2015. The approved Total Estimated Cost (TEC) range for this project is \$76,500,000 to \$95,000,000. The approved Total Project Cost (TPC) range for this project is \$77,500,000 to \$96,000,000.

A Federal Project Director with certification level 2 has been assigned to this project.

This project will provide new laboratory and office space to support energy-related materials science and engineering research. Conceptual Design was completed in November 2014 and Preliminary Design was completed in September 2015. FY 2017 funds will be used for construction.

**2. Critical Milestone History**

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2015	08/27/2010	N/A	4Q FY 2014	4Q FY 2015 <sup>a</sup>	4Q FY 2016	3Q FY 2016 <sup>a</sup>	N/A	2Q FY 2020 <sup>a</sup>
FY 2016	08/27/2010	1Q FY 2015	2Q FY 2015	2Q FY 2016 <sup>a</sup>	3Q FY 2017	1Q FY 2017 <sup>a</sup>	N/A	3Q FY 2020 <sup>a</sup>
FY 2017	08/27/2010	11/12/2014	01/30/2015	3Q FY 2016 <sup>a</sup>	2Q FY 2017	4Q FY 2017 <sup>a</sup>	N/A	3Q FY 2021 <sup>a</sup>

**CD-0** – Approve Mission Need

**Conceptual Design Complete** – Actual date the conceptual design was completed

**CD-1** – Approve Alternative Selection and Cost Range

**CD-2** – Approve Performance Baseline

**Final Design Complete** – Estimated date the project design will be completed

**CD-3** – Approve Start of Construction

**D&D Complete** – Completion of D&D Work (see Section 9)

**CD-4** – Approve Project Completion

Performance Baseline Validation
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FY 2015	N/A
FY 2016	1Q FY 2017 <sup>a</sup>
FY 2017	3Q FY 2016 <sup>a</sup>

<sup>a</sup> This project is pre-CD-2 and schedule estimates are preliminary.

### 3. Project Cost History

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC <sup>a</sup> Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	7,000	88,000 <sup>b</sup>	95,000 <sup>b</sup>	1,000	N/A	1,000	96,000 <sup>b</sup>
FY 2016	7,000	88,000 <sup>b</sup>	95,000 <sup>b</sup>	1,000	N/A	1,000	96,000 <sup>b</sup>
FY 2017	7,000	88,000 <sup>b</sup>	95,000 <sup>b</sup>	1,000	N/A	1,000	96,000 <sup>b</sup>

### 4. Project Scope and Justification

#### Scope

The scope of this project includes the design and construction of a Materials Design Laboratory building at least 97,000 gross square feet in size and located adjacent to the recently completed Energy Sciences Building.

The table below outlines the approved KPPs.

#### Key Performance Parameters

Description	Threshold Value (Minimum)	Objective Value (Maximum)
Multi-story laboratory building	97,000 gross square feet	130,000 gross square feet

#### Justification

The mission need of this project is to provide flexible and sustainable laboratory and office space needed to support scientific theory/simulation, materials discovery, characterization, and application of new energy-related materials and processes. The Materials Design Laboratory project will provide the modern collaborative scientific environment critical for this initiative to thrive and will focus on four themes central to implementing the Materials for Energy strategy:

- Frontiers of materials and molecular synthesis, and fabrication of devices;
- Interfacial engineering for energy applications;
- Materials under extreme conditions; and
- *In situ* characterization and modeling.

FY 2017 funds will be used for construction, project management, and support activities.

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

<sup>a</sup> Other Project Costs (OPC) are funded through laboratory overhead.

<sup>b</sup> This project has not received CD-2 approval; funding estimates are consistent with the approved cost ranges. The approved TEC range for this project is \$76,500,000 to \$95,000,000. The approved TPC range for this project is \$77,500,000 to \$96,000,000.

**5. Preliminary Financial Schedule**

(dollars in thousands)			
	Appropriations	Obligations	Costs <sup>a</sup>
<b>Total Estimated Cost (TEC)</b>			
Design			
FY 2015	7,000	7,000	2,773
FY 2016	0	0	3,727
FY 2017	0	0	500
<b>Total, Design</b>	<b>7,000</b>	<b>7,000</b>	<b>7,000</b>
Construction			
FY 2016	23,910	23,910	0
FY 2017	19,590	19,590	10,000
FY 2018	24,500	24,500	35,000
FY 2019	20,000	20,000	25,000
FY 2020	0	0	18,000
<b>Total, Construction</b>	<b>88,000</b>	<b>88,000</b>	<b>88,000</b>
<b>TEC</b>			
FY 2015	7,000	7,000	2,773
FY 2016	23,910	23,910	3,727
FY 2017	19,590	19,590	10,500
FY 2018	24,500	24,500	35,000
FY 2019	20,000	20,000	25,000
FY 2020	0	0	18,000
<b>Total, TEC<sup>b</sup></b>	<b>95,000</b>	<b>95,000</b>	<b>95,000</b>
<b>Other Project Cost (OPC)<sup>c</sup></b>			
OPC except D&D			
FY 2010	412	412	412
FY 2011	-30 <sup>d</sup>	-30 <sup>d</sup>	-30 <sup>d</sup>
FY 2014	300	300	300
FY 2015	318	318	318
<b>Total, OPC except D&amp;D</b>	<b>1,000</b>	<b>1,000</b>	<b>1,000</b>
<b>Total Project Cost (TPC)</b>			
FY 2010	412	412	412
FY 2011	-30 <sup>d</sup>	-30 <sup>d</sup>	-30 <sup>d</sup>
FY 2014	300	300	300
FY 2015	7,318	7,318	3,091
FY 2016	23,910	23,910	3,727
FY 2017	19,590	19,590	10,500

<sup>a</sup> Costs through FY 2015 reflect actual costs; costs for FY 2016 and the outyears are estimates.

<sup>b</sup> This project has not received CD-2 approval; funding estimates are consistent with the approved cost ranges. The approved TEC range for this project is \$76,500,000 to \$95,000,000. The approved TPC range for this project is \$77,500,000 to \$96,000,000.

<sup>c</sup> Other Project Costs (OPC) are funded through laboratory overhead.

<sup>d</sup> OPC Funding was adjusted in FY 2011 to reflect FY 2010 actuals (\$382,000 for OPC funding in FY 2010).

	(dollars in thousands)		
	Appropriations	Obligations	Costs <sup>a</sup>
FY 2018	24,500	24,500	35,000
FY 2019	20,000	20,000	25,000
FY 2020	0	0	18,000
Total, TPC <sup>b</sup>	96,000	96,000	96,000

## 6. Details of Project Cost Estimate

	(dollars in thousands)		
	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
<b>Total Estimated Cost (TEC)</b>			
<b>Design</b>			
Design	6,000	6,000	6,708
Contingency	1,000	1,000	292
Total, Design	7,000	7,000	7,000
<b>Construction</b>			
Construction	73,000	73,000	76,260
Contingency	15,000	15,000	11,740
Total, Construction	88,000	88,000	88,000
Total, TEC <sup>b</sup>	95,000	95,000	95,000
Contingency, TEC	16,000	16,000	12,032
<b>Other Project Cost (OPC)<sup>c</sup></b>			
<b>OPC except D&amp;D</b>			
Conceptual Planning	382	382	382
Conceptual Design	500	500	618
Contingency	118	118	0
Total, OPC	1,000	1,000	1,000
Contingency, OPC	118	118	0
Total, TPC <sup>b</sup>	96,000	96,000	96,000
Total, Contingency	16,118	16,118	12,032

<sup>a</sup> Costs through FY 2015 reflect actual costs; costs for FY 2016 and the outyears are estimates.

<sup>b</sup> This project has not received CD-2 approval; funding estimates are consistent with the approved cost ranges. The approved TEC range for this project is \$76,500,000 to \$95,000,000. The approved TPC range for this project is \$77,500,000 to \$96,000,000.

<sup>c</sup> Other Project Costs (OPC) are funded through laboratory overhead.

## 7. Schedule of Appropriation Requests

(dollars in thousands)

Request Year		Prior Years	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	Total
FY 2015	TEC	0	0	7,000	24,003	36,466	27,531	0	95,000 <sup>a</sup>
	OPC <sup>b</sup>	382	500	0	0	0	118	0	1,000
	TPC	382	500	7,000	24,003	36,466	27,649	0	96,000 <sup>a</sup>
FY 2016	TEC	0	0	7,000	23,910	25,090	39,000	0	95,000 <sup>a</sup>
	OPC <sup>b</sup>	382	300	0	0	0	318	0	1,000
	TPC	382	300	7,000	23,910	25,090	39,318	0	96,000 <sup>a</sup>
FY 2017	TEC	0	0	7,000	23,910	19,590	24,500	20,000	95,000 <sup>a</sup>
	OPC <sup>b</sup>	382	300	318	0	0	0	0	1,000
	TPC	382	300	7,318	23,910	19,590	24,500	20,000	96,000 <sup>a</sup>

## 8. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy	3Q FY 2020
Expected Useful Life	50 years
Expected Future Start of D&D of this capital asset	3Q FY 2070

### (Related Funding requirements)

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	376	N/A	18,800	N/A
Utilities	429	N/A	21,450	N/A
Maintenance and Repair	958	N/A	47,900	N/A
Total, Operations & Maintenance	1,763	N/A	88,150	N/A

<sup>a</sup> This project has not received CD-2 approval; funding estimates are consistent with the approved cost ranges. The approved TEC range for this project is \$76,500,000 to \$95,000,000. The approved TPC range for this project is \$77,500,000 to \$96,000,000.

<sup>b</sup> Other Project Costs (OPC) are funded through laboratory overhead.

**9. 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 <i>Argonne National Laboratory</i> .....	97,000
Area of D&D in this project at <i>Argonne National Laboratory</i> .....	None
Area at <i>Argonne National Laboratory</i> 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" .....	97,000
Total area eliminated .....	None

ANL will comply via the FY 2012 waiver from EM ETPP to ANL. ANL's net banked square footage as reported in the FY 2013 Report on DOE's disposition of excess real property for future one-for-one offsets stands at 577,955 SF.

**10. Acquisition Approach**

Acquisition for this project will be performed by the Management and Operating (M&O) contractor, UChicago Argonne, LLC, and will be overseen by the Argonne Site Office. Various acquisition approaches and project delivery methods were evaluated prior to achieving CD-1. A tailored Design-Bid-Build approach was selected as the overall best project delivery method with the lowest risk to DOE. The M&O contractor is responsible for awarding and administering all subcontracts related to this project. Project performance metrics are included in the M&O Contractor's annual performance evaluation and measurement plan.

**15-SC-77 Photon Science Laboratory Building  
SLAC National Accelerator Laboratory, Menlo Park, California  
Project is for Design and Construction**

**1. Significant Changes and Summary**

**Significant Changes**

This Construction Project Data Sheet (CPDS) is an update of the FY 2016 CPDS and does not include a new start for FY 2017.

The upper end of the Key Performance Parameter (KPP) range for the project has been updated from 75,000 gross square feet (GSF) to 100,000 GSF in accordance with the analysis at Critical Decision (CD)-1, Approve Alternative Selection and Cost Range.

**Summary**

The FY 2017 Request for the Photon Science Laboratory Building is \$20,000,000, which is \$5,000,000 less than the FY 2016 Enacted level and consistent with the preliminary funding profile. The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, *Approve Alternative Selection and Cost Range*, which was approved September 23, 2015. The Total Estimated Cost (TEC) range for the DOE funded portion of this project is \$43,300,000 to \$55,000,000. The estimated Total Project Cost (TPC) range for the DOE funded portion of this project is \$45,300,000 to \$57,000,000.

Stanford University has begun construction of a cold, dark shell including the building enclosure, foundation, structure, and infrastructure pathways. This project funds the design and fit-out of a large portion of the shell’s interior for SLAC use, providing significantly more useable space than two separate buildings. The fit-out will include utilities and services (e.g. building-wide mechanical/electrical/plumbing equipment) for the entire building and offices and infrastructure in support of the approved mission need.

A Federal Project Director with certification level 3 has been assigned to this project and has approved this CPDS.

**2. Critical Milestone History**

(fiscal quarter or date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2015	4/18/2011	N/A	1Q FY 2015	4Q FY 2015 <sup>a</sup>	1Q FY 2017	3Q FY 2016 <sup>a</sup>	N/A <sup>b</sup>	1Q FY 2019 <sup>a</sup>
FY 2016	4/18/2011	3Q FY 2015	3Q FY 2015	1Q FY 2016 <sup>a</sup>	3Q FY 2016	3Q FY 2016 <sup>a</sup>	N/A <sup>b</sup>	2Q FY 2018 <sup>a</sup>
FY 2017	4/18/2011	5/04/2015	9/23/2015	1Q FY 2017 <sup>a</sup>	3Q FY 2017	4Q FY 2017 <sup>a</sup>	N/A <sup>b</sup>	2Q FY 2020 <sup>a</sup>

**CD-0** – Approve Mission Need

**Conceptual Design Complete** – Actual Date the conceptual design was completed

**CD-1**– Approve Alternative Selection and Cost Range

**CD-2** – Approve Performance Baseline

**Final Design Complete** – Estimated date the project design will be completed

**CD-3** – Approve Start of Balance of Construction Activities

**D&D Complete** – Completion of D&D work (see Section 9)

**CD-4** – Approve Start of Operations or Project Closeout

<sup>a</sup> This project is pre-CD-2 and schedule estimates are preliminary.

<sup>b</sup> The project is not building additional space; therefore, D&D is not applicable.

	Performance Baseline Validation
FY 2015	N/A
FY 2016	4Q FY 2016 <sup>a</sup>
FY 2017	4Q FY 2016 <sup>a</sup>

### 3. Project Cost History

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC <sup>b</sup> Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	4,000	51,000 <sup>c</sup>	55,000	2,000	0	2,000	57,000 <sup>c</sup>
FY 2016	6,000	49,000 <sup>c</sup>	55,000	2,000	0	2,000	57,000 <sup>c</sup>
FY 2017	6,000	49,000 <sup>c</sup>	55,000	2,000	0	2,000	57,000 <sup>c</sup>

### 4. Project Scope and Justification

#### Scope

Upon construction of the shell by the Stanford University, the PSLB project will prepare a large portion of the shell's interior for SLAC use. Utilities and services (e.g., elevators, stairways, building-wide mechanical/electrical/plumbing equipment) for the entire building and framing and furnishing up to 100,000 GSF will be provided. The fit-out will be designed and constructed in order to provide a complete and usable facility.

#### Key Performance Parameters (Preliminary):

Description	Threshold Value (Minimum)	Objective Value (Maximum)
Laboratory building interior fit-out	55,000 gross square feet	100,000 gross square feet

#### Justification

To accommodate the growth in research programs that has occurred since 2011, and continues to accelerate in recent years, modern laboratory/office space is needed above and beyond the existing campus space for a range of simulation, theory and modeling, synthesis and characterization capabilities. The lab/office space will also support research collaborations with outside scientists engaged with SLAC's Linac Coherent Light Source (LCLS) and Stanford Synchrotron Radiation Lightsource (SSRL) user facilities. Fit-out by the Office of Science (SC) of the Photon Science Laboratory Building is needed to provide centralized modern laboratory and office space with the necessary performance capabilities and accommodate growth in the existing photon science program. The Photon Science Laboratory Building would leverage the capabilities of two of the country's world-class light sources, LCLS and SSRL, as well as the Photon Ultrafast Laser Science and Engineering (PULSE) and Stanford Institute for Materials and Energy Sciences (SIMES) photon institutes. Without modern facilities suitable for collocated and coordinated functionality, the laboratory's ability to successfully address and deliver on the long term strategic mission of the laboratory will be limited.

SLAC is an SC laboratory that supports a large national and international community of scientific users performing cutting-edge research in support of the DOE mission. SLAC was built in 1962 to perform research in accelerator-based particle

<sup>a</sup> This project is pre-CD-2 and schedule estimates are preliminary.

<sup>b</sup> Other Project Costs (OPC) are funded through laboratory overhead.

<sup>c</sup> This project has not received CD-2 approval; funding estimates are consistent with the preliminary cost ranges. The preliminary TEC cost range for this project is \$43,300,000 to \$55,000,000. The preliminary TPC cost range for this project is \$45,300,000 to \$57,000,000.

physics. Expansion and upgrade of the SSRL and the LCLS located at SLAC are producing rapid increases to photon science facility use, thereby increasing the need for space to accommodate the new and expanded research program.

The FY 2015 funds were used for preliminary design and project management and support activities. The FY 2016 funds were used for construction, project management, and support activities. FY 2017 funds will be used for construction and project management and support activities.

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

## 5. Preliminary Financial Schedule

(dollars in thousands)			
	Appropriations	Obligations	Costs <sup>a</sup>
<b>Total Estimated Cost (TEC)</b>			
<b>Design</b>			
FY 2015	6,000	6,000	0
FY 2016	0	0	5,500
FY 2017	0	0	500
<b>Total, Design</b>	<b>6,000</b>	<b>6,000</b>	<b>6,000</b>
<b>Construction</b>			
FY 2015	4,000	0	0
FY 2016 <sup>b</sup>	25,000	29,000	0
FY 2017 <sup>b</sup>	20,000	20,000	34,000
FY 2018	0	0	15,000
<b>Total, Construction</b>	<b>49,000</b>	<b>49,000</b>	<b>49,000</b>
<b>TEC</b>			
FY 2015	10,000	6,000	0
FY 2016	25,000	29,000	5,500
FY 2017	20,000	20,000	34,500
FY 2018	0	0	15,000
<b>Total, TEC<sup>c</sup></b>	<b>55,000</b>	<b>55,000</b>	<b>55,000</b>
<b>Other Project Cost (OPC)<sup>d</sup></b>			
<b>OPC except D&amp;D</b>			
FY 2014	230	230	230
FY 2015	242	242	242
FY 2017	459	459	459
FY 2018	1,069	1,069	1,069
<b>Total, OPC except D&amp;D</b>	<b>2,000</b>	<b>2,000</b>	<b>2,000</b>

<sup>a</sup> Costs through FY 2015 reflect actual costs; costs for FY 2016 and the outyears are estimates.

<sup>b</sup> No construction will be performed until the project performance baseline has been validated and CD-3 has been approved.

<sup>c</sup> This project has not received CD-2 approval; funding estimates are consistent with the preliminary cost ranges. The preliminary TEC cost range for this project is \$43,300,000 to \$55,000,000. The preliminary TPC cost range for this project is \$45,300,000 to \$57,000,000.

<sup>d</sup> Other Project Costs are funded through laboratory overhead.

	(dollars in thousands)		
	Appropriations	Obligations	Costs <sup>a</sup>
Total Project Cost (TPC)			
FY 2014	230	230	230
FY 2015	10,242	6,242	242
FY 2016	25,000	29,000	5,500
FY 2017	20,459	20,459	34,959
FY 2018	1,069	1,069	16,069
Total, TPC <sup>b</sup>	57,000	57,000	57,000

## 6. Details of Project Cost Estimate

	(dollars in thousands)		
	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
Total Estimated Cost (TEC)			
Design			
Design	4,600	5,000	N/A
Contingency	1,400	1,000	N/A
Total, Design	6,000	6,000	N/A
Construction			
Construction	41,400	40,500	N/A
Contingency	7,600	8,500	N/A
Total, Construction	49,000	49,000	N/A
Total, TEC <sup>b</sup>	55,000	55,000	N/A
Contingency, TEC	9,000	9,500	N/A
Other Project Cost (OPC) <sup>c</sup>			
OPC except D&D			
Conceptual Design	500	1,200	N/A
Start-Up	1,000	450	N/A
Contingency	500	350	N/A
Total, OPC	2,000	2,000	N/A
Contingency, OPC	500	350	N/A
Total, TPC <sup>b</sup>	57,000	57,000	N/A
Total, Contingency	9,500	9,850	N/A

<sup>a</sup> Costs through FY 2015 reflect actual costs; costs for FY 2016 and the outyears are estimates.

<sup>b</sup> This project has not received CD-2 approval; funding estimates are consistent with the preliminary cost ranges. The preliminary TEC cost range for this project is \$43,300,000 to \$55,000,000. The preliminary TPC cost range for this project is \$45,300,000 to \$57,000,000.

<sup>c</sup> Other Project Costs (OPC) are funded through laboratory overhead.

**7. Schedule of Appropriation Requests**

Request		(dollars in thousands)					Total
Year		FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	
FY 2015	TEC	0	12,890	25,770	16,340	0	55,000 <sup>a</sup>
	OPC <sup>b</sup>	1,341	0	200	459	0	2,000
	TPC	1,341	12,890	25,970	16,799	0	57,000 <sup>a</sup>
FY 2016	TEC	0	10,000	25,000	20,000	0	55,000 <sup>a</sup>
	OPC <sup>b</sup>	671	100	492	737	0	2,000
	TPC	671	10,100	25,492	20,737	0	57,000 <sup>a</sup>
FY 2017	TEC	0	10,000	25,000	20,000	0	55,000 <sup>a</sup>
	OPC <sup>b</sup>	230	242	0	459	1,069	2,000
	TPC	230	10,242	25,000	20,459	1,069	57,000 <sup>a</sup>

**8. Related Operations and Maintenance Funding Requirements**

Start of Construction or Beneficial Occupancy (fiscal quarter and year)	2Q FY 2020
Expected Useful Life (number of years)	50
Expected Future Start of D&D of this capital asset (fiscal quarter and year)	2Q FY 2070

**(Related Funding requirements)**

	(dollars in thousands)			
	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	340	N/A	10,925	N/A
Utilities	278	N/A	8,917	N/A
Maintenance	1,929	N/A	61,912	N/A
Total, Operations & Maintenance	2,547	N/A	81,754	N/A

**9. D&D Information**

	Square Feet
New area being constructed by this project at <i>SLAC National Accelerator Laboratory</i> ...	N/A
Area of D&D in this project at <i>SLAC National Accelerator Laboratory</i> .....	N/A
Area at <i>SLAC National Accelerator Laboratory</i> to be transferred, sold, and/or D&D outside the project including area previously "banked" .....	N/A
Area of D&D in this project at other sites.....	N/A
Area at other sites to be transferred, sold, and/or D&D outside the project including area previously "banked" .....	N/A
Total area eliminated .....	N/A

<sup>a</sup> This project has not received CD-2 approval; funding estimates are consistent with the preliminary cost ranges. The preliminary TEC cost range for this project is \$43,300,000 to \$55,000,000. The preliminary TPC cost range for this project is \$45,300,000 to \$57,000,000.

<sup>b</sup> Other Project Costs (OPC) are funded through laboratory overhead.

SLAC National Accelerator Laboratory net banked square footage for future one-for-one offset as reported in FIMS stands at 263,000 SF. Since there will not be construction of any additional space in this project, the one-for-one offset is not applicable.

## **10. Acquisition Approach**

Acquisition for this project will be performed by the Management and Operating (M&O) contractor, Stanford University and overseen by the SLAC Site Office. DOE will utilize SLAC to acquire the project under the existing DOE Management & Operations Contract (DE-AC02-76-SF00515). As such, SLAC has the ultimate responsibility to successfully execute the project under the direction of the Federal Project Director (FPD). SLAC has determined that a CM/GC approach would be most efficient and appropriate for interior construction of PSLB. All PSLB procurements will be based on firm fixed-price sub-contracts. Project performance metrics are included in the M&O contractor's annual performance evaluation and measurement plan.

**15-SC-78, Integrative Genomics Building  
Lawrence Berkeley National Laboratory (LBNL), Berkeley, California  
Project is for Design and Construction**

**1. Significant Changes and Summary**

**Significant Changes**

This Construction Project Data Sheet (CPDS) is an update of the FY 2016 CPDS and does not include a new start for FY 2017.

The budgeted amount for PED funds in FY 2015 is reduced by \$3,090,000 to \$6,500,000 to reflect a slightly less conservative cost estimate for preliminary and final design. The budgeted amount of Construction funds was increased by the same amount to result in \$83,500,000 for construction funding. The approved Total Estimated Cost (TEC) range for this project remains as \$79,600,000 to \$90,000,000.

**Summary**

The FY 2017 Request for the Integrative Genomics Building is \$19,561,000, which is \$439,000 less than the FY 2016 Enacted level and consistent with the approved baseline funding profile. The most recent DOE O 413.3B approved Critical Decision (CD) is CD-1, Approve Alternative Selection and Cost Range, and was approved on February 20, 2015. The approved Total Estimated Cost (TEC) range for this project is \$79,600,000 to \$90,000,000. The approved Total Project Cost (TPC) range for this project is \$81,100,000 to \$91,500,000.

A Federal Project Director with certification level 2 has been assigned to this project.

This project will provide new space necessary to relocate a significant fraction of biosciences research currently occupying leased commercial space onto the main LBNL campus. Conceptual Design was completed in October 2014 and Preliminary Design was completed in December 2015. FY 2017 funds will be used for construction.

**2. Critical Milestone History**

(fiscal quarter to date)

	CD-0	Conceptual Design Complete	CD-1	CD-2	Final Design Complete	CD-3	D&D Complete	CD-4
FY 2015	9/17/2013	N/A	1Q FY 2015	3Q FY 2016 <sup>a</sup>	4Q FY 2016	3Q FY 2016 <sup>a</sup>	N/A	1Q FY 2021 <sup>a</sup>
FY 2016	9/17/2013	1Q FY 2015	2Q FY 2015	2Q FY 2016 <sup>a</sup>	3Q FY 2016	4Q FY 2016 <sup>a</sup>	N/A	1Q FY 2021 <sup>a</sup>
FY 2017	9/17/2013	10/28/2014	02/20/2015	2Q FY 2016 <sup>a</sup>	3Q FY 2016	1Q FY 2017 <sup>a</sup>	N/A	1Q FY 2021 <sup>a</sup>

**CD-0** – Approve Mission Need

**Conceptual Design Complete** – Actual date the conceptual design was completed

**CD-1** – Approve Alternative Selection and Cost Range

**CD-2** – Approve Performance Baseline

**Final Design Complete** – Estimated date the project design will be completed

**CD-3** – Approve Start of Construction

**D&D Complete** – Completion of D&D work (see Section 9)

**CD-4** – Approve Project Completion

<sup>a</sup> This project is pre-CD-2 and schedule estimates are preliminary.

Performance Baseline Validation
---------------------------------------

FY 2015 N/A  
 FY 2016 N/A  
 FY 2017 PB 2Q FY 2016<sup>a</sup>

### 3. Project Cost History

(dollars in thousands)

	TEC, Design	TEC, Construction	TEC, Total	OPC <sup>b</sup> Except D&D	OPC, D&D	OPC, Total	TPC
FY 2015	12,090	77,910 <sup>c</sup>	90,000 <sup>c</sup>	1,500	0	1,500	91,500 <sup>c</sup>
FY 2016	9,590	80,410 <sup>c</sup>	90,000 <sup>c</sup>	1,500	0	1,500	91,500 <sup>c</sup>
FY 2017	6,500	83,500 <sup>c</sup>	90,000 <sup>c</sup>	1,500	0	1,500	91,500 <sup>c</sup>

### 4. Project Scope and Justification

#### Scope

The scope of this project includes the design and construction of a new state-of-the-art facility for bioscience research approximately 79,000 gross square feet in size and located on the main LBNL campus in Berkeley, California. The facility will be physically located on the former site of the recently demolished Bevatron particle accelerator.

#### Key Performance Parameters

Description	Threshold Value (Minimum)	Objective Value (Maximum)
Biosciences and other research space	79,000 gross square feet	95,000 gross square feet

#### Justification

The mission need of this project is to increase the synergy and efficiency of biosciences and other research at Lawrence Berkeley National Laboratory (LBNL). LBNL has grown from a pioneering particle and nuclear physics laboratory into a multidisciplinary research facility with broad capabilities in physical, chemical, computational, biological, and environmental systems research in support of the Department of Energy (DOE) mission. Portions of the biosciences program at LBNL are located off-site, away from the main laboratory, and dispersed across several locations approximately twenty miles apart. This arrangement has produced research and operational capability gaps that limit scientific progress, in genomics-based biology related to energy and the environment. This project will close the present capability gaps by providing a state-of-the-art facility that will collocate biosciences research and other programs.

FY 2017 funds will be used for construction and project management and support activities.

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

<sup>a</sup> This project is pre-CD-2 and schedule estimates are preliminary.

<sup>b</sup> Other project costs (OPC) are funded through laboratory overhead.

<sup>c</sup> This project has not received CD-2 approval; funding estimates are consistent with the approved cost ranges. The approved TEC range for this project is \$79,600,000 to \$90,000,000. The approved TPC range for this project is \$81,100,000 to \$91,500,000.

## 5. Preliminary Financial Schedule

(dollars in thousands)			
	Appropriations	Obligations	Costs <sup>a</sup>
<b>Total Estimated Cost (TEC)</b>			
<b>Design</b>			
FY 2015	6,500	6,500	2,086
FY 2016	0	0	4,414
<b>Total, Design</b>	<b>6,500</b>	<b>6,500</b>	<b>6,500</b>
<b>Construction</b>			
FY 2015	5,590	5,590	0
FY 2016	20,000	20,000	0
FY 2017	19,561	19,561	23,500
FY 2018	38,349	38,349	24,000
FY 2019	0	0	24,000
FY 2020	0	0	12,000
<b>Total, Construction</b>	<b>83,500</b>	<b>83,500</b>	<b>83,500</b>
<b>TEC</b>			
FY 2015	12,090	12,090	2,086
FY 2016	20,000	20,000	4,414
FY 2017	19,561	19,561	23,500
FY 2018	38,349	38,349	24,000
FY 2019	0	0	24,000
FY 2020	0	0	12,000
<b>Total, TEC<sup>b</sup></b>	<b>90,000</b>	<b>90,000</b>	<b>90,000</b>
<b>Other Project Cost (OPC)<sup>c</sup></b>			
<b>OPC except D&amp;D</b>			
FY 2014	1,145	1,145	1,145
FY 2015	355	355	355
<b>Total, OPC</b>	<b>1,500</b>	<b>1,500</b>	<b>1,500</b>
<b>Total Project Cost (TPC)</b>			
FY 2014	1,145	1,145	1,145
FY 2015	12,445	12,445	2,441
FY 2016	20,000	20,000	4,414
FY 2017	19,561	19,561	23,500
FY 2018	38,349	38,349	24,000
FY 2019	0	0	24,000
FY 2020	0	0	12,000
<b>Total, TPC<sup>b</sup></b>	<b>91,500</b>	<b>91,500</b>	<b>91,500</b>

<sup>a</sup> Costs through FY 2015 reflect actual costs; costs for FY 2016 and the outyears are estimates.

<sup>b</sup> This project has not received CD-2 approval; funding estimates are consistent with the approved cost ranges. The approved TEC range for this project is \$79,600,000 to \$90,000,000. The approved TPC range for this project is \$81,100,000 to \$91,500,000.

<sup>c</sup> Other Project Costs (OPC) are funded through laboratory overhead.

**6. Details of Project Cost Estimate**

(dollars in thousands)

	Current Total Estimate	Previous Total Estimate	Original Validated Baseline
<b>Total Estimated Cost (TEC)</b>			
<b>Design</b>			
Design	5,964	8,590	5,964
Contingency	536	1,000	536
<b>Total, Design</b>	<b>6,500</b>	<b>9,590</b>	<b>6,500</b>
<b>Construction</b>			
Construction	71,265	68,210	71,265
Contingency	12,235	12,200	12,235
<b>Total, Construction</b>	<b>83,500</b>	<b>80,410</b>	<b>83,500</b>
<b>Total, TEC<sup>a</sup></b>	<b>90,000</b>	<b>90,000</b>	<b>90,000</b>
<b>Contingency, TEC</b>	<b>12,771</b>	<b>13,200</b>	<b>12,771</b>
<b>Other Project Cost (OPC)<sup>b</sup></b>			
<b>OPC except D&amp;D</b>			
<b>Conceptual</b>			
Planning	355	400	355
Conceptual Design	1,145	1,000	1,145
Startup	0	0	0
Contingency	0	100	0
<b>Total, OPC</b>	<b>1,500</b>	<b>1,500</b>	<b>1,500</b>
<b>Contingency, OPC</b>	<b>0</b>	<b>100</b>	<b>0</b>
<b>Total, TPC<sup>a</sup></b>	<b>91,500</b>	<b>91,500</b>	<b>N/A</b>
<b>Total, Contingency</b>	<b>12,771</b>	<b>13,300</b>	<b>N/A</b>

**7. Schedule of Appropriation Requests**

(dollars in thousands)

Request Year		FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	Total
FY 2015	TEC	0	12,090	17,299	30,148	30,463	0	90,000 <sup>a</sup>
	OPC <sup>b</sup>	1,300	0	0	0	0	200	1,500
	TPC	1,300	12,090	17,299	30,148	30,463	200	91,500 <sup>a</sup>
FY 2016	TEC	0	12,090	20,000	25,064	32,846	0	90,000 <sup>a</sup>
	OPC <sup>b</sup>	1,500	0	0	0	0	0	1,500
	TPC	1,500	12,090	20,000	25,064	32,846	0	91,500 <sup>a</sup>
FY 2017	TEC	0	12,090	20,000	19,561	38,349	0	90,000 <sup>a</sup>
	OPC <sup>b</sup>	1,145	355	0	0	0	0	1,500
	TPC	1,145	12,445	20,000	19,561	38,349	0	91,500 <sup>a</sup>

<sup>a</sup> This project has not received CD-2 approval; funding estimates are consistent with the approved cost ranges. The approved TEC range for this project is \$79,600,000 to \$90,000,000. The approved TPC range for this project is \$81,100,000 to \$91,500,000.

<sup>b</sup> Other Project Costs (OPC) are funded through laboratory overhead.

**8. Related Operations and Maintenance Funding Requirements**

Start of Operation or Beneficial Occupancy	1Q FY 2020
Expected Useful Life	50 years
Expected Future Start of D&D of this capital asset	1Q FY 2070

**(Related Funding requirements)**

(dollars in thousands)

	Annual Costs		Life Cycle Costs	
	Current Total Estimate	Previous Total Estimate	Current Total Estimate	Previous Total Estimate
Operations	179	N/A	5,735	N/A
Utilities	324	N/A	11,919	N/A
Maintenance and Repair	644	N/A	20,662	N/A
<b>Total, Operations &amp; Maintenance</b>	<b>1,147</b>	<b>N/A</b>	<b>38,316</b>	<b>N/A</b>

**9. D&D Information**

The new area that will be constructed in this project will not replace existing facilities.

	Square Feet
New area being constructed by this project at <i>Lawrence Berkeley National Laboratory</i> .....	79,000
Area of D&D in this project at <i>Lawrence Berkeley National Laboratory</i> .....	None
Area at <i>Lawrence Berkeley National Laboratory</i> to be transferred, sold, and/or D&D outside the project including area previously “banked” .....	79,000
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

Lawrence Berkeley National Laboratory will comply via space previously “banked.” Lawrence Berkeley National Laboratory net banked square footage for future one-for-one offset as reported in the last FIMS update of September 26, 2013 stands at 165,000 SF.

**10. Acquisition Approach**

Acquisition for this project will be performed by the Management and Operating (M&O) Contractor, University of California, and overseen by the Berkeley Site Office. Various acquisition approaches and project delivery methods were evaluated prior to achieving CD-1. A tailored Design-Bid-Build approach with a Construction Manager as General Contractor was selected as the overall best project delivery method with the lowest risk to DOE. The M&O contractor is responsible for awarding and administering all subcontracts related to this project. Project performance metrics are included in the M&O contractor’s annual performance evaluation and measurement plan.