

Campus Strategy

Fermilab's campus strategy implements the Campus Master Plan, thus enabling the laboratory to deliver on the U.S. particle physics community's science goals as outlined in the P5 plan. In addition to reducing inefficiencies associated with functional obsolescence and geographically dispersed facilities, the campus strategy represents a comprehensive approach to Fermilab's future infrastructure.

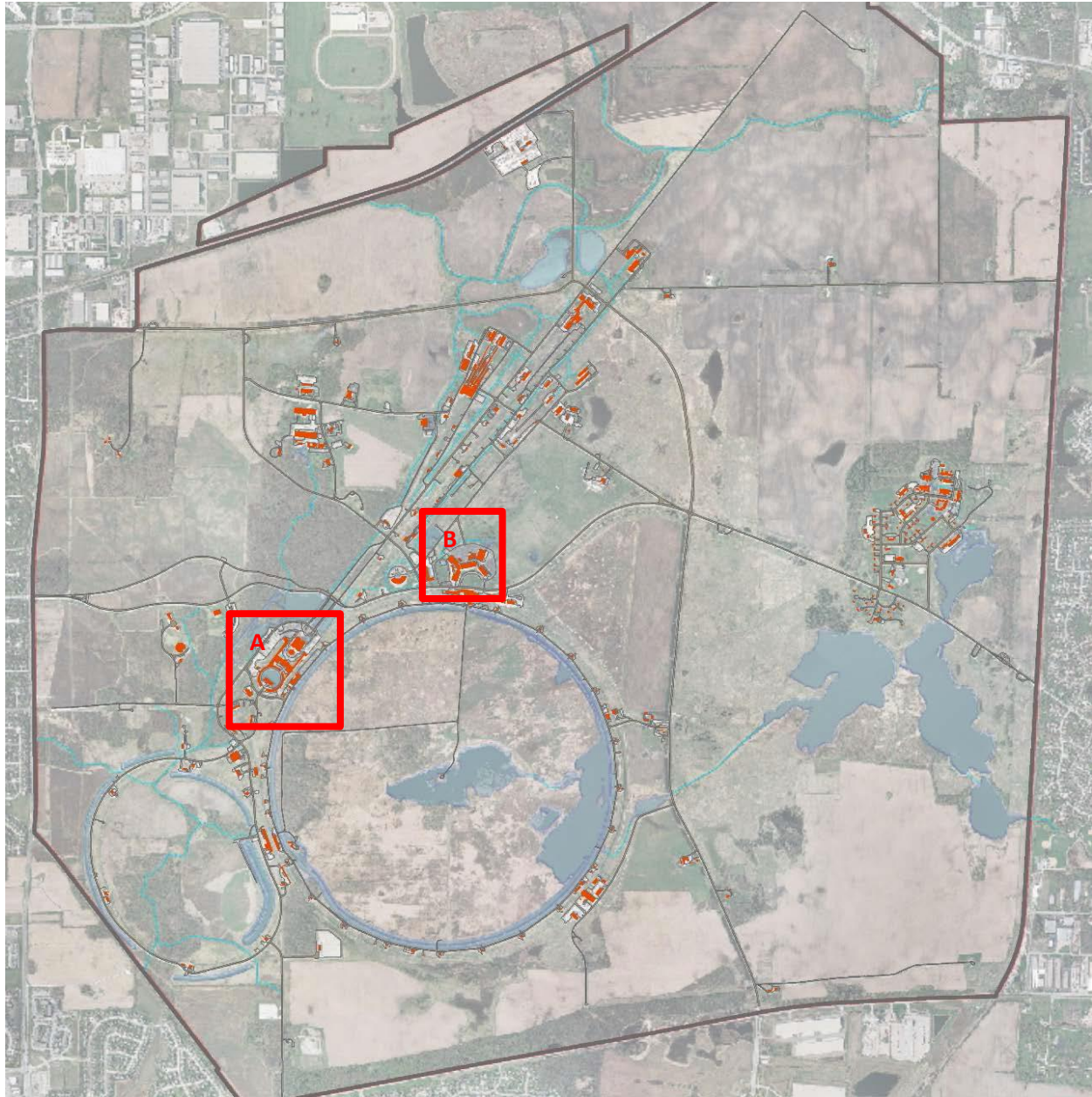
The campus strategy has four primary objectives:

- Construct sustainable infrastructure that will attract international investment and the brightest minds to the world's leading laboratory for accelerator-based neutrino physics.
- Maximize productivity by establishing an atmosphere of *"eat-sleep-work to drive discovery"* that efficiently meets the needs of the scientific community.
- Integrate into one geographic area the entire life cycle of research, engineering, fabrication, and operations expertise for accelerators and detectors.
- Consolidate, centralize, and modernize to optimize operational resources, maximize efficiency, enhance communication, and foster succession planning.

These objectives address the needs of the laboratory's core capabilities by providing facilities and infrastructure to close identified infrastructure gaps, including: deficient space for project teams and international users for the first-ever large-scale international science facility hosted in the United States; inefficiencies of matrixed resources between projects and operations; inadequate or substandard facilities; and limited production facility high-bay space.

The laboratory's utility infrastructure will continue to require further investment to accommodate ongoing operations and future mission needs. When siting future projects, Fermilab's Facilities Engineering Services Section works closely with experimental planning groups, project teams, the laboratory's Campus Facility Planning Board, and the Office of Campus Strategy and Readiness to efficiently use existing facilities or develop plans to expand facilities. Infrastructure gaps are prioritized according to mission need.

The Center for Integrated Engineering Research (IER) is the highest-priority project needed to bring the technical and scientific resources that are currently scattered across the site into closer proximity to foster a more effective and efficient work environment. The IER is expected to support other Office of Science programs in addition to Fermilab's core Office of High Energy Physics programs. For technical and scientific personnel who will have both project and operational responsibilities, the IER will enable them to perform both functions more effectively and shift more easily between activities. The resulting productivity improvements will be necessary for success in an era when Fermilab is carrying out a large project portfolio. IER construction can be phased so that the most urgent needs to relocate resources to the Central Campus can be addressed in accordance with priorities established by the P5 plan.



Fermilab site map. Buildings are highlighted in orange. The Fermilab Village, which is located on the east side of the site (shown on the right side of the map), includes both residential and technical legacy facilities. The technical facilities will be relocated to the central (A) and technical (B) campus areas.

The campus plan defines a Central Campus, centered on Wilson Hall, that features a guesthouse for the “sleep” portion of the “eat-sleep-work to drive discovery” theme. The guesthouse is envisioned as serving the needs of short-term visitors, thereby supplementing the longer-term housing in the Fermilab Village. The Central Campus also includes the future site of the PIP-II accelerator upgrade, which will provide the beam power that is needed to support the laboratory’s future world-leading program in neutrino science. Wilson Hall itself may see its first modernization projects begin in FY16 if funding proposed in the President’s Budget Request is allocated. The Wilson Hall refurbishment project, one of three General Plant Projects (GPP) proposed in the FY14 SC crosscut submission, increases density through standardized floor plans and reconfigurable walls and furniture. Other GPP crosscut candidates in the Central Campus are the Sanitary Sewer Improvements, Central Utility Building improvements, Excess Facilities Removal and DZero Assembly Building Renovation.



Artist rendering of the scientific hostel located near the existing Lederman Science Center. Wilson Hall is shown in the background.

Just south of the Central Campus is the Muon Campus. Fermilab has funded Muon Campus construction activities (using HEP GPP funding) to redevelop and repurpose existing infrastructure in support of the Mu2e and Muon g-2 projects, which are currently under construction. Within a short walking distance from the Central Campus is the Neutrino Campus, which includes the Liquid Argon Test Facility that houses the MicroBooNE detector and the Short-Baseline Neutrino (SBN) program. Construction of two new detector buildings for SBN will begin in FY15.

The Technical Campus houses fabrication, production, and testing facilities for LCLS-II and PIP-II cryomodules, high-field magnets for CERN’s LHC accelerator, and solenoids for Mu2e. The challenge for the Technical Campus is to provide the needed capability for production capacity given the availability of limited production space. The first step towards satisfying this infrastructure gap is to construct the Industrial Center High Bay Addition. Initially proposed as a possible SLI project, further definition of the requirements and a more urgent timeframe have resulted in a change in strategy to meet the need using HEP GPP funding in FY17. The Industrial Center Building Gateway and Central Fabrication Facility projects, SLI candidates included in the Investment table, are also needed to consolidate functions and facilities.



Rendering of the Industrial Center High Bay Addition.

Deferred maintenance requirements of the laboratory's utility infrastructure currently comprise 89% of the site's total FY14 deferred maintenance backlog, or \$39M of a total \$45M. Most notably, electrical systems and industrial cooling water underground piping are in need of significant investment, accounting for 52% of the FY14 OSF deferred maintenance. The integrated facilities and infrastructure cross-cut budget profile through FY20 includes investments in domestic water and industrial cooling 30 Annual Laboratory Planning Fermilab piping systems, the Central Utility Building and computing upgrades, in addition to support for the Short-Baseline Neutrino program. While additional utility GPP projects are identified in the lab's five-year infrastructure budget plan, investment via the Office of Science's SLI Modernization Initiative will provide improved reliability of the most critical utility systems. The SLI Utilities Upgrade Project, fully funded in FY14, will reduce the projected overall deferred maintenance by 20%, deferred maintenance on electrical systems by 60%, and on industrial cooling water by 80%. The combination of ongoing maintenance at 2% of Fermilab's conventional replacement plant value, laboratory and Office of Science GPP projects, SLI investment, and substantial demolition of facilities is expected to control the deferred maintenance backlog to an acceptable level.

Fermilab's core capabilities are subject to the same risks described above from deferred maintenance and infrastructure gaps. The potential failure of Fermilab's Master Substation (MSS) is the number one

current risk, with site-wide science down time the potential result. The SLI-funded Utilities Upgrades Project mitigates this risk by completely rebuilding the MSS building and contents. The second risk is the continued inefficiency in operations, particularly in terms of functionally obsolete buildings, geographically dispersed locations, utility failures due to aging systems, isolated downtimes due to localized failures, and resources consumed by excess facilities. Several legacy buildings from the original site development in the Fermilab Village are still used for lab space and manufacturing facilities despite being classified as inadequate or substandard under the LOB assessment. A candidate for an FY17 GPP crosscut is funding for Excess Facilities Removal of these and other buildings as elements of the Campus Master Plan are implemented and such functions are relocated to modern facilities in the Central Campus.