
Fermilab
2018 campus master plan
U.S. DEPARTMENT OF ENERGY
Office of Science
Fermi Research Alliance LLC

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# Planning Context

Director's statement

The Fermilab Campus Master Plan presents a vision for how to centralize, consolidate and modernize the facilities of a laboratory hosting a world-leading, accelerator-based neutrino program. The plan's implementation will position Fermilab as one of the top research destinations of choice for present and future generations of particle physicists.

Fermilab will be a place where researchers and staff easily connect, work collaboratively and exchange ideas in their quest to lead, inspire and enable scientists from all over the world. Just as we look to our strategic laboratory plan to direct the laboratory's scientific program, we look to the Campus Master Plan for providing a place to make the scientific program possible.

*~ Nigel Lockyer, Fermilab director*

# Foreword

What are we made of? How did the universe begin? What secrets do the smallest, most elemental particles of matter hold, and how can they help us understand the intricacies of space and time? Since 1967, Fermilab has worked to answer these and other fundamental questions to enhance our understanding of everything we see around us.

However, much has changed in the world of basic science research since 1967. The system of national laboratories, made up of the places where answers are researched, is undergoing a transition. The postwar laboratory model, expressed in scattered, dark and narrow bunker-like places, is giving way to open and transparent international centers for generating and sharing knowledge.

Responding to these changes, the Fermilab Campus Master Plan presents a transformative plan to create an open, inviting and collaborative international research community for 21st-century science. Charting a path for the transition, it establishes the framework and the key elements of the Fermilab campus, reflecting a vision for future development. It synthesizes the collective goals and aspirations for the laboratory, giving them form and organization, and defines a realistic plan for implementation.

The plan is organized in three parts. Part I, Planning Context, introduces the laboratory and provides baseline planning information campus history and geography, along with strategic goals and guiding principles to guide and inform future plans. Part II, Emerging Priorities, presents campus-wide initiatives to organize and design the campus for future development. Part III, Development Plan, describes development projects culminating in an international research community, with the scientific tools and supporting infrastructure to enable the next generation of world-leading research.

# The Laboratory

Fermilab, the only U.S. national laboratory dedicated totally to particle physics, was founded in 1967. The 1,700 employees and 2,000 scientific users advance humankind's understanding of matter, energy, space and time by carrying out a world-leading program of discovery. The backbone that supports this mission is Fermilab's core capabilities in accelerator science and technology; advanced computer science, visualization and data; particle physics; and large-scale user facilities.

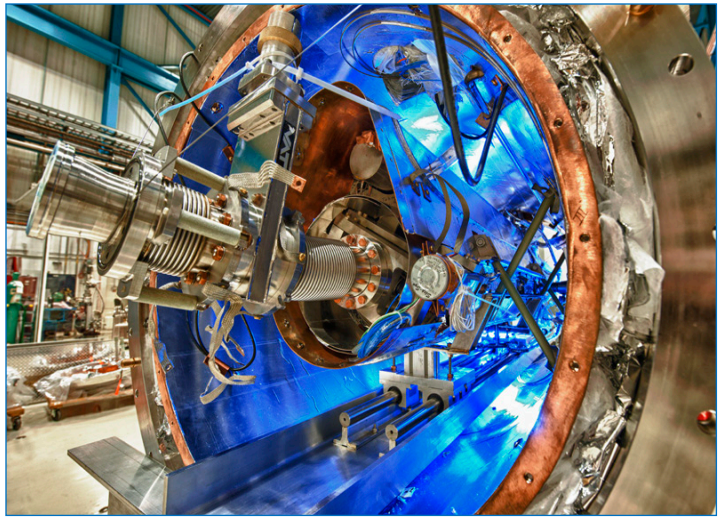
The laboratory is managed by the Fermi Research Alliance LLC, an organization made up of the University of Chicago and a consortium of 87 other universities. All laboratory buildings are owned by the U.S. Department of Energy.

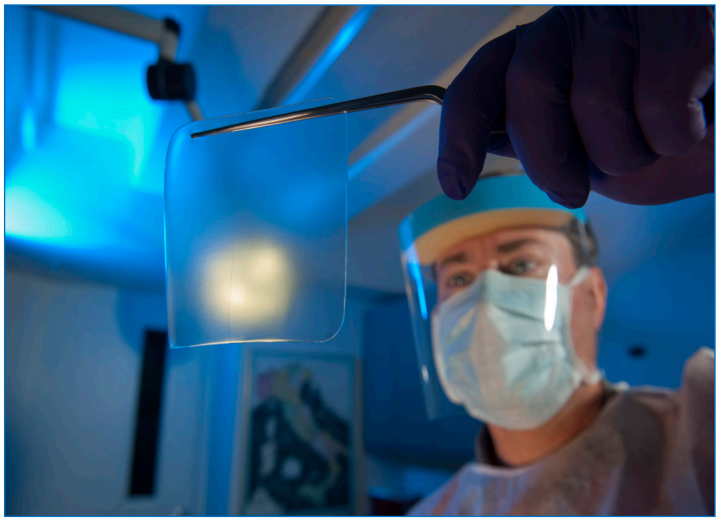
Fermilab is home to one of the largest accelerator facilities in the world, including a powerful accelerator complex, test accelerators and infrastructure for the development of accelerator technologies. The laboratory's accelerator complex produces the world's most powerful high-energy beam of neutrinos, mysterious subatomic particles studied by scientists around the globe. It also provides intense beams that allow scientists to study ultrarare processes in nature. Its staff and users build, operate and lead experiments to investigate dark matter, dark energy and ultrahigh-energy cosmic rays. Additionally, Fermilab is a U.S. hub for research at the Large Hadron Collider and for R&D for the next generation of particle accelerators and detectors for use in science and society.

# Distinct Character

Fermilab is a multifaceted place with a distinct character and culture, creating a fertile environment complementing and enhancing its research mission. Delineating what people like most about Fermilab, the following narratives and photos describe the character and culture that create a place more than the sum of the parts.

**Science and Technology:** At the forefront of particle physics for five decades, Fermilab builds world-leading accelerators and detectors to conduct some of the most advanced particle physics experiments possible, then collects and analyzes the data from those experiments with some of the most powerful computers in the world. The laboratory's accelerator complex produces the world's most powerful high-energy beam of neutrinos, mysterious subatomic particles studied by scientists around the globe. It also provides intense beams that allow scientists to study ultrarare processes in nature. Its staff and users build, operate and lead experiments to investigate dark matter, dark energy and ultrahigh-energy cosmic rays.





**International Community and Worldwide Reach:** The people of Fermilab form an international community of scientists, engineers and support staff. Intellectual curiosity is energized by sharing a zeal for discovery and by working collaboratively and cooperatively on common goals. Fermilab is a U.S. hub for research at the Large Hadron Collider and for R&D for the next generation of particle accelerators and detectors for use in science and society. As an international center for particle physics research, Fermilab's scientists work with thousands of physicists around the world to conduct experiments probing the nature of matter, energy, space and time.

**People and Diversity:** As an organization, Fermilab is committed to attracting, developing and retaining diverse talent and cultivating an inclusive work environment that supports scientific, technological and operational excellence. Laboratory efforts to cultivate a diverse and inclusive labwide workforce include recruitment strategies, pipeline education programs, community outreach and collaboration efforts. Initiatives and programs aim to increase the recruitment and retention of underrepresented racial minorities, other people of color, women, veterans and individuals with disabilities in the lab's education, employment and outreach platforms

**Safety:** As the United States premier particle physics laboratory, Fermilab is committed to supporting its research and operations by protecting the health and safety of our staff, the community and the environment.

To meet this objective and fully support the laboratory's scientific mission, scientists, technicians and visitors work closely with environment, safety, health and quality professionals and subject matter experts from a variety of disciplines to plan, build and achieve successful experiments. Through this spirit of collaboration we have been able to create a truly integrated, world-class health and safety program that ensures excellence and continuous improvement now and into the future.

**STEM and Education:** Fermilab is committed to developing a science, technology, engineering and mathematics, or STEM, workforce and stimulating science literacy. Laboratory programs serve students at all levels, from prekindergarten to graduate school.

The Fermilab Education Office supports programming for educators, families, young people and the public. Our programs provide avenues for technical staff to engage these audiences with Fermilab's science and technology. Themes include scientific discovery, practical applications, and scientific and engineering practices. Because the next-generation STEM workforce is in school today, educator programs must strengthen teaching and learning in science, technology, engineering and mathematics. Our programs are a catalyst for change and a resource to schools and districts nationwide.


**Sustainability and Environment:** The laboratory is committed to using natural resources sustainably, striving for energy efficiency, using renewable energy sources and designing buildings to minimize waste. This commitment includes integrating sustainable design into its buildings and practices.

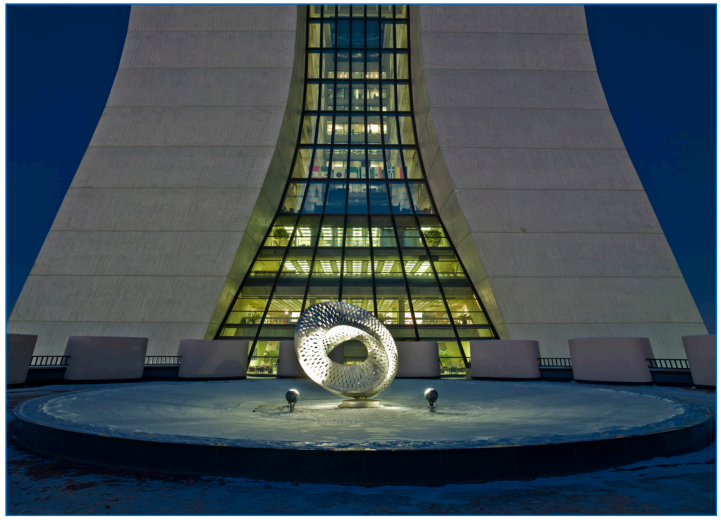
Sustainable design comprises numerous interrelated approaches. The varied approaches combine to form a complete systematic path to sustainability. Planning efforts aim beyond just building design, encompassing all aspects of building and siting and development and operations. The laboratory implements renewable-energy methods where possible; works to improve the energy efficiency of existing buildings; recycles waste and uses products that are durable, less toxic and easily recycled; restores and conserves our land and its diverse species.

**By the Numbers:** The Fermilab Campus occupies 6,800 acres of former farmland 42 miles west of Chicago in Batavia, Illinois. Purchased by the state of Illinois and turned over to the Atomic Energy Commission (a precursor to the Department of Energy), the site includes hundreds of buildings totaling about 2.4 million gross square feet of space. The laboratory includes 122 acres of parking lots. Utilities on the site include two primary electrical substations, 241 secondary electrical substations, 27 miles of underground industrial cooling water, and 14 miles of underground sanitary piping. Also on site are the Central Utility Building. All totaled, hundreds of miles of utility infrastructure, including roads, electrical, natural gas, industrial cooling water, potable water and sanitary systems spread across the 6,800 acres.

**Buildings and Sculpture:** Founder Robert R. Wilson hoped to create "a Utopian place where scientists could gather from around the world." He strove to create a campus blending its natural environment with architectural grandeur and cultural splendor. Dr. Wilson helped design the centerpiece of the site, the stately 16-story Robert Rathbun Wilson Hall, inspired by a Gothic cathedral in Beauvais, France. The building serves as a central meeting place, housing the laboratory's cafeteria and the campus's largest concentration of offices. Adjoining Wilson Hall to the south is the 830-seat Norman F. Ramsey Auditorium, which hosts numerous talks and cultural events. Wilson also influenced the unique design and character of several other founding-era buildings and structures on campus and created several of the site's iconic sculptures.

**Natural Setting:** Fermilab's built environment is complemented by a biologically diverse natural environment. The campus includes over 2,500 acres of natural areas, containing rich and diverse ecosystems such as tallgrass prairie, oak woodland, sedge meadow and floodplain forest. These habitats are important for rare plants and many kinds of wildlife, including upwards of 300 species of birds, numerous uncommon butterflies, dragonflies and other insects, thriving populations of amphibians and reptiles, and mammals such as coyote and mink. The laboratory is committed to the beauty and ecological integrity of these places.

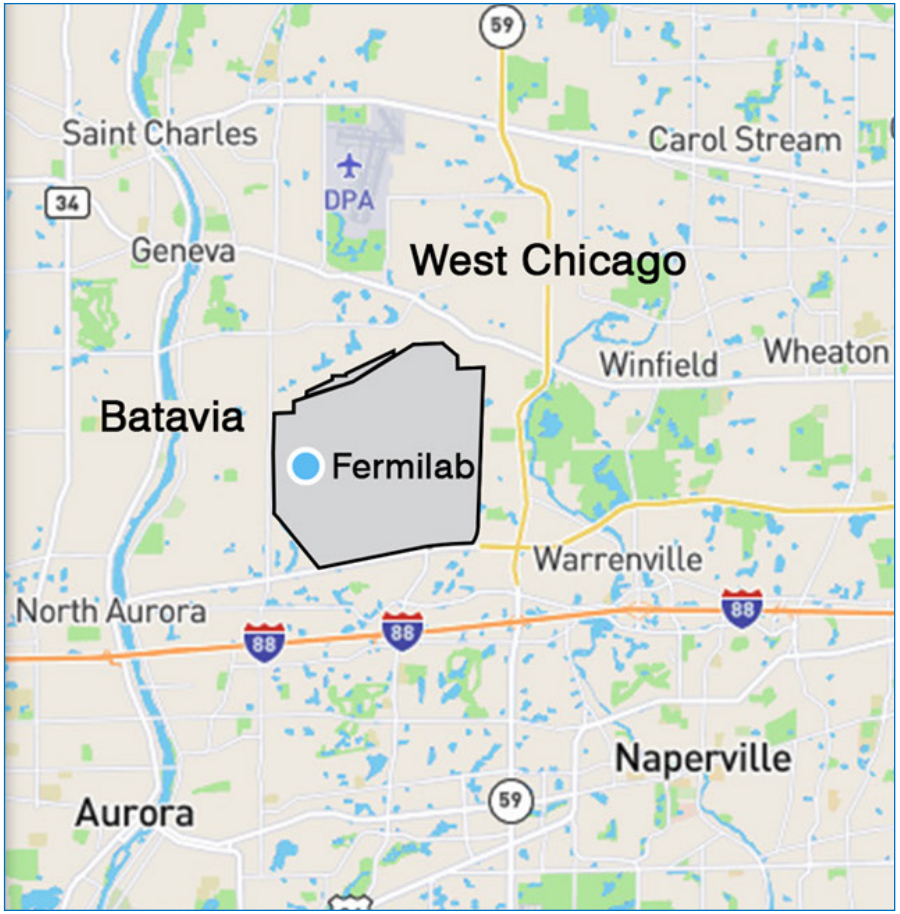
Visitors to the site enjoy hiking, fishing, bird watching, bicycling, cross-country skiing and photography. In 1989, Fermilab was designated a National Environmental Research Park, one of seven in the United States.



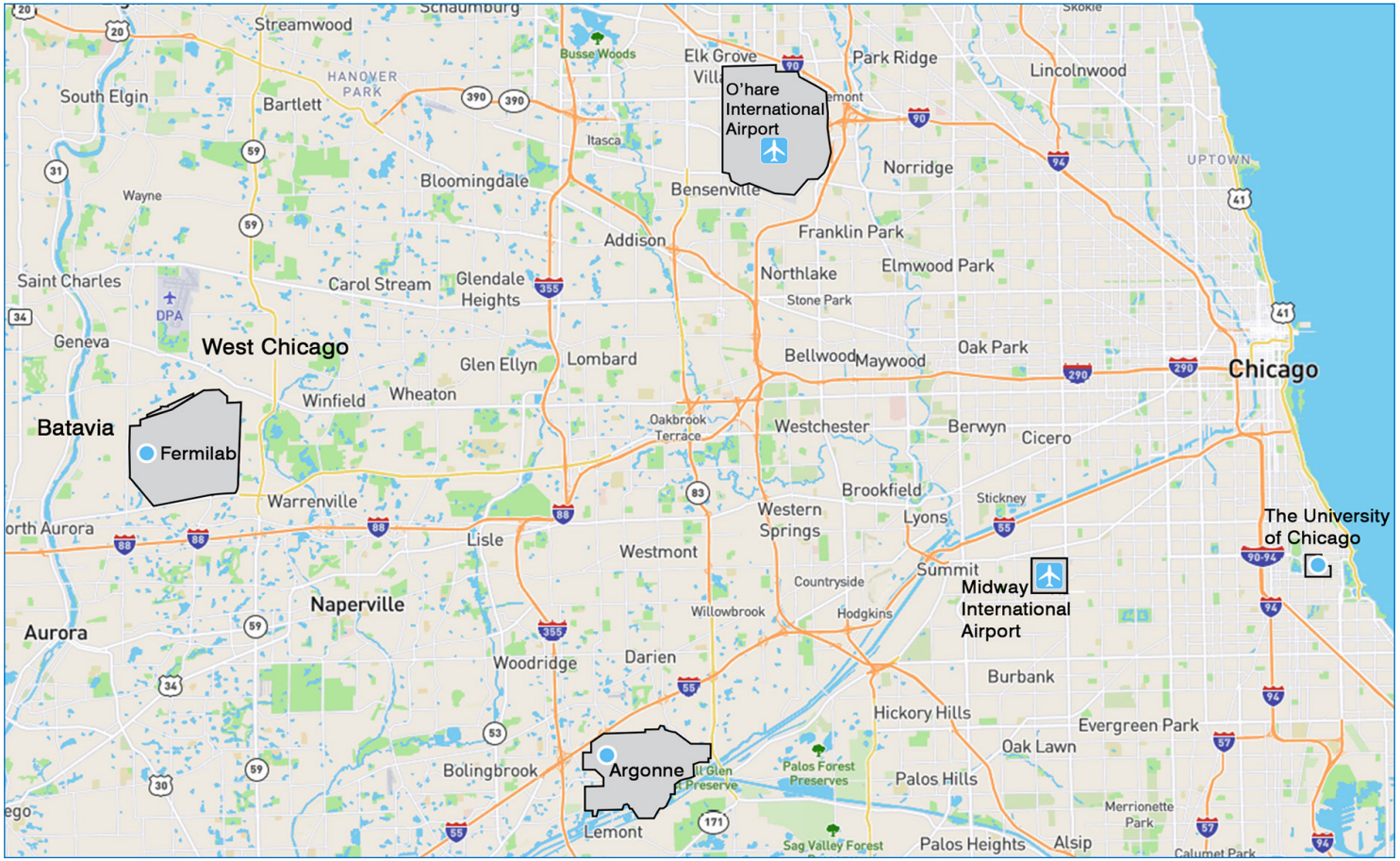
# Campus Geography

## 1. Fermilab Location Map

Fermilab is in Batavia, Illinois, 42 miles west of Chicago, Illinois. It is surrounded by the communities of Batavia, North Aurora, West Chicago and Warrenville. The main entrance is from Kirk Road on the west side of the site. Kirk Road is easily accessed from Interstate 88 to the south. A secondary entrance used by many staff is on the east side of the site through Warrenville. The service entrance is at the northwest corner of the site also accessed from Kirk Road.



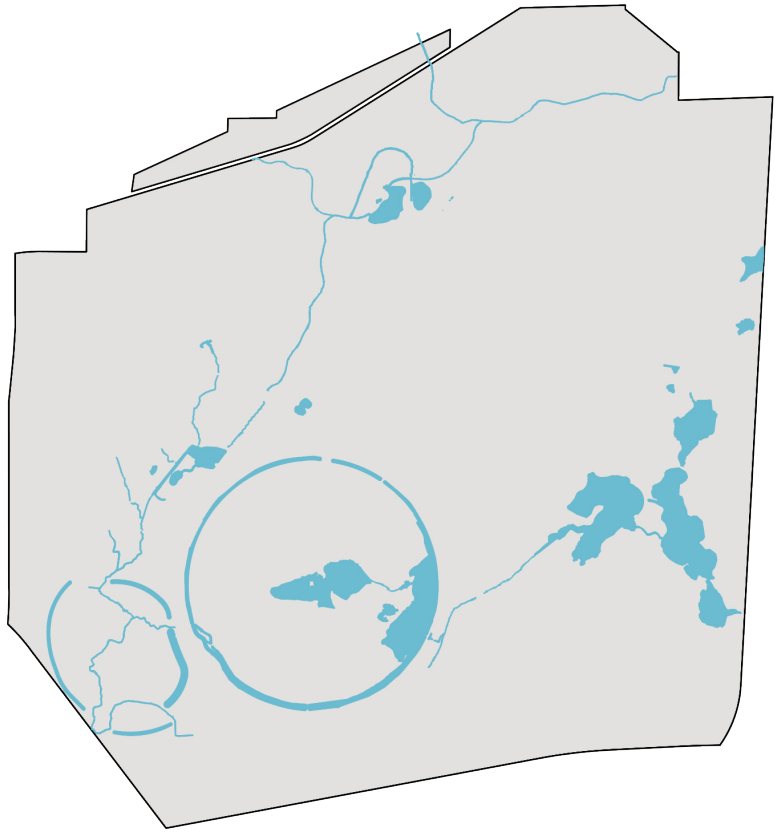
# Area Location Map



# 2. A Science Campus

Fermilab's 6,800-acre site encompasses current and planned large-scale physics research activities and installations. The maps on the following pages illustrate both how the site is used currently, as well as near term plans and long-term potential.

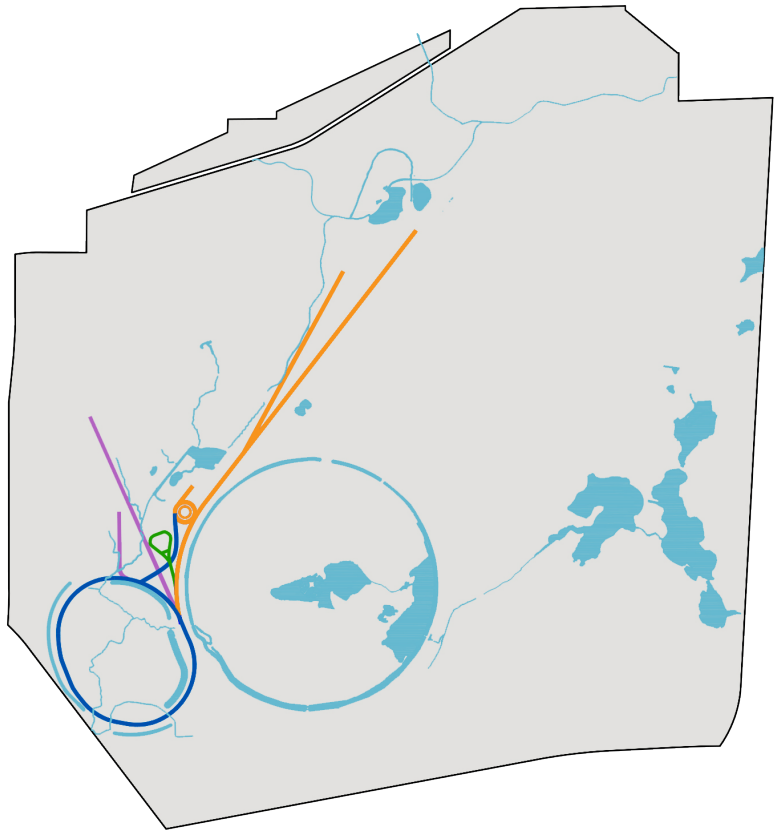
Area available for science



# 3. Current Beamlines

This map illustrates existing underground active experiment beamlines and experiment installations.

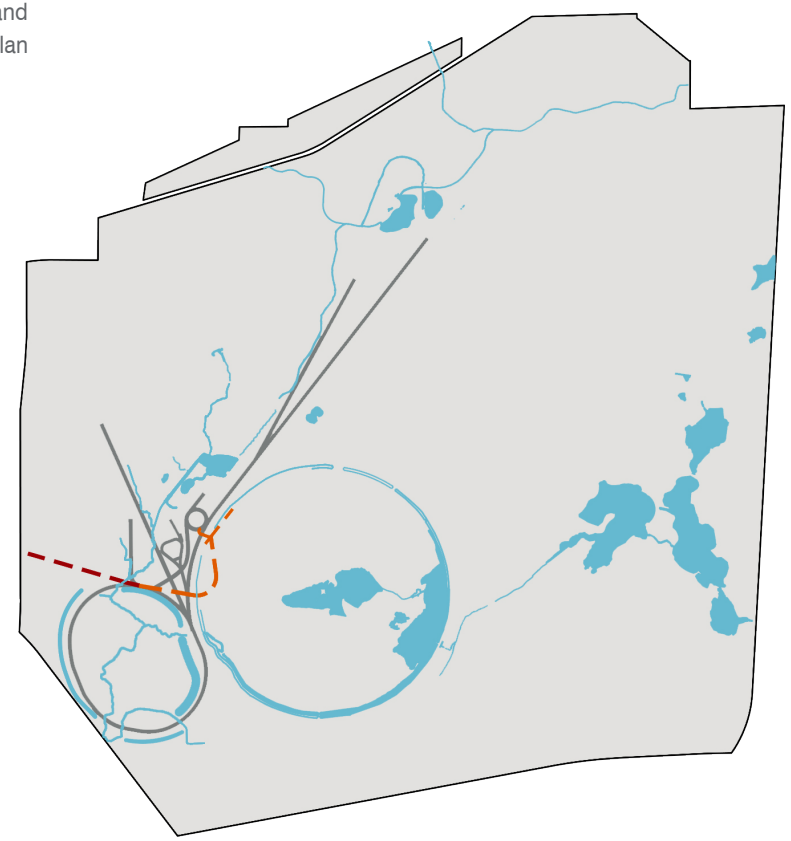
- Linac and Booster
- Neutrino and Booster Neutrino
- Muon / Anti-proton
- Main Injector



# 4. Future Beamlines - Near Term

This map illustrates underground beamlines and installations currently in planning. These are anticipated for construction and active experiment operations in the Fermilab Campus Master Plan execution 20-year timeline.

- Continued from previous era
- PIP-II and PIP-III
- Long-Baseline Neutrino Facility

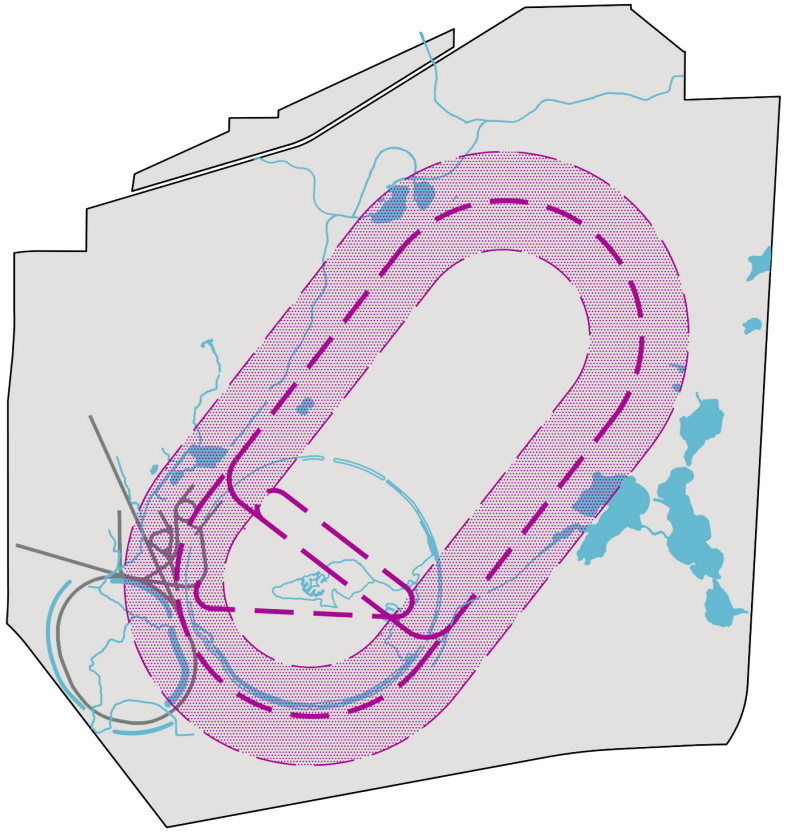


# 5. Long-Term Options

As noted in earlier maps, the entire site is dedicated and suitable for new and sometimes unforeseen science research infrastructure. Illustrated below is one possible manifestation of the sites potential, a muon collider, imagined beyond the 20-year Fermilab Campus master plan horizon.

Continued From previous era

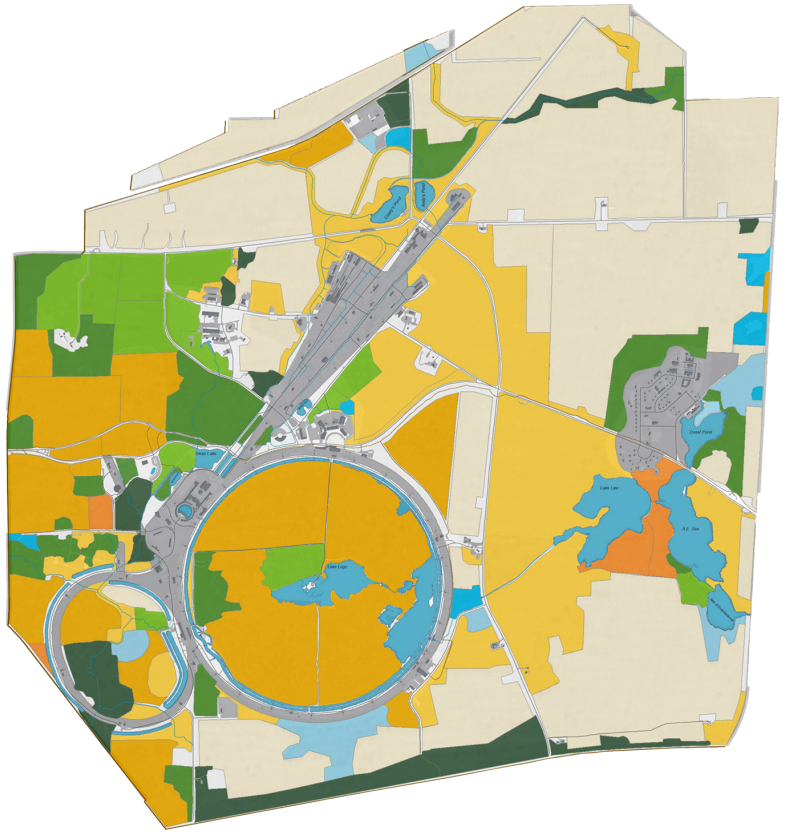
Muon Collider



# 6. Habitat Communities

The laboratory site is home to many types of habitat communities providing STEM education, environmental conservation and sustainability opportunities. As science installations expand, reasonable efforts are always employed to maintain these valuable resources while harmonizing with the science mission.

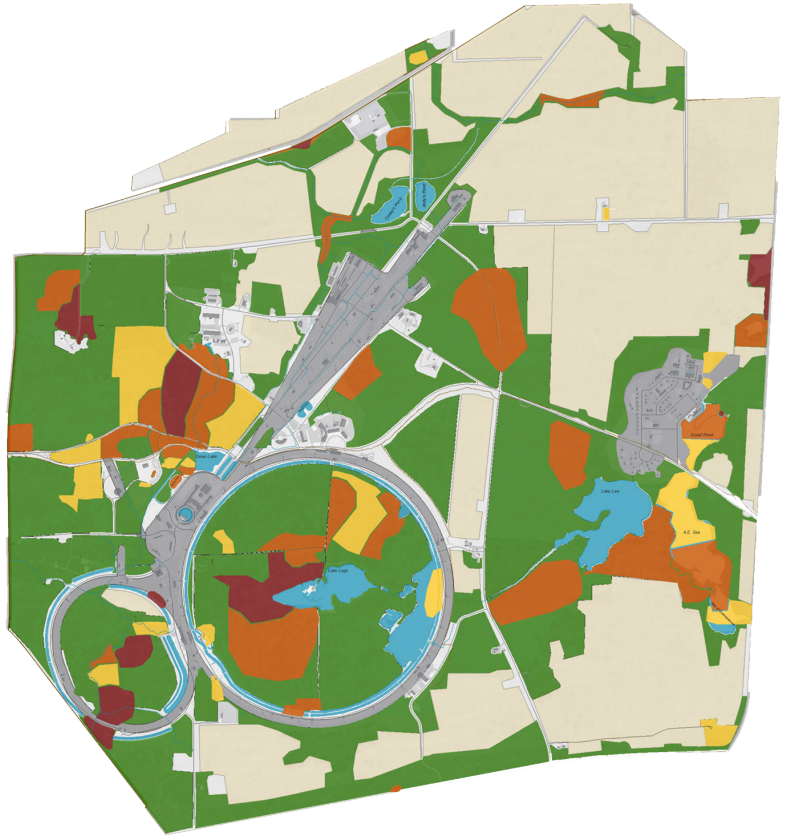
- Prairie
- Sedge Meadow
- Forest
- Grassland
- Woodland
- Developed
- Savanna
- Agriculture
- Shrub-land
- Open Water
- Marsh



# 7. Ecologically Sensitive Areas

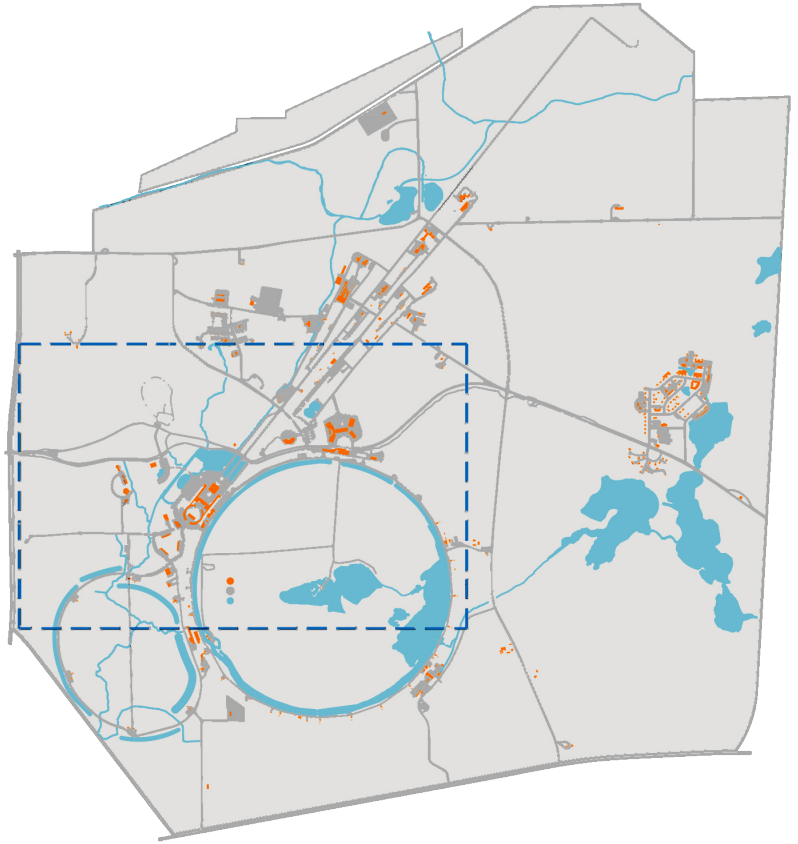
The purpose of this map is to make Fermilab staff (senior management, project planners, engineers, environmental reviewers, operations staff and the grounds crew) aware of areas that have special sensitivity and to avoid unnecessary impacts to them. It was created by superimposing multiple sources of biological data (representing thousands of samples across many years) on a map of the site and using established criteria to determine areas of high, medium or low sensitivity. All habitat areas are important and carry intrinsic weight, but this work highlights areas worthy of deeper consideration and protection.

- High Sensitivity
- Medium Sensitivity
- Low Sensitivity
- Habitat
- Developed
- Agriculture



# 8. Surface Developments

Site development has typically "followed the science" throughout Fermilab's 50 years. Earlier technologies tended to require that computer rooms and people be near the experiments. However, advances in technology, communication and computing have opened the way for remote operation and monitoring of facilities. This trend is helping to drive more condensed and centralized developments, creating a more connected community of researchers.



Buildings

Paved Area

Water

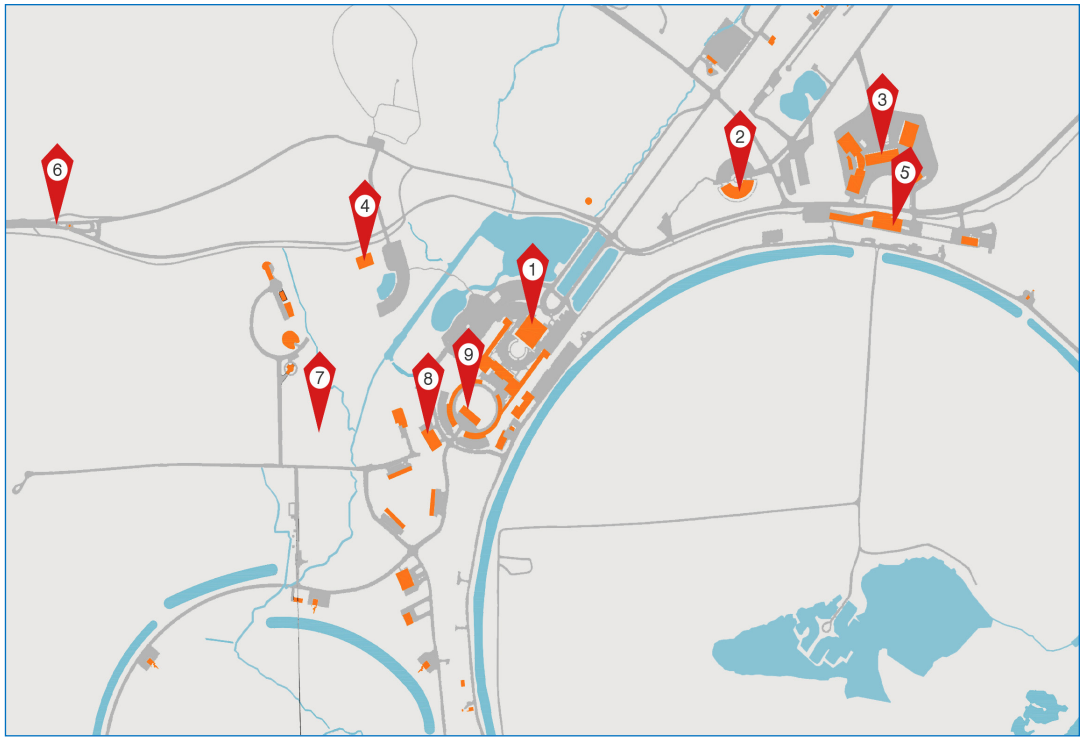
Area of Enlarged Central Area Plan
*(facing page)*

## Central Area Enlargement

# 9. Existing Central Campus

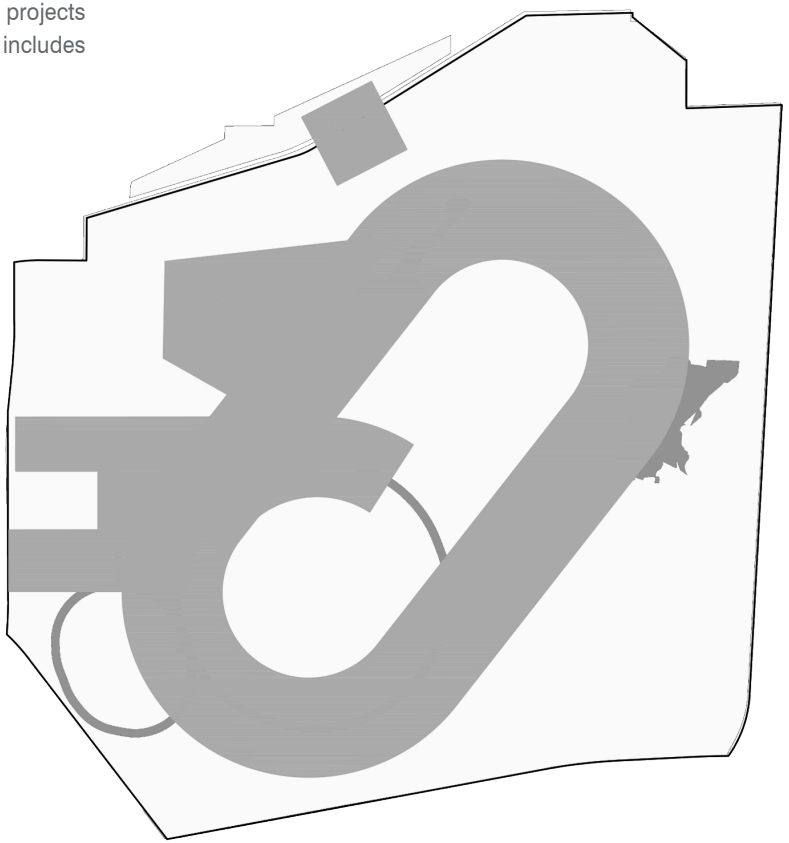
This diagram illustrates the major facilities and focal points of the central region of the campus. Part three of this Fermilab Campus Master Plan repeats this illustration, identifying major planned new facilities and significant improvements and upgrades to existing facilities.

1. Wilson Hall
2. Feynman Computing Center
3. Industrial Buildings
4. Lederman Science Center
5. Illinois Accelerator Research Center (IARC)
6. Pine Street (Main) Entrance
7. Neutrino Campus
8. Muon Campus
9. Central Utility Building (CUB)



# 10. Potential Development Area (2050)

This map illustrates the potential scope of site development by the year 2050. The shaded area encompasses existing development, projects currently in planning and potential long-term options. The area includes both surface and below-ground facilities.



# Campus History

Campus development has been 105 years in the making. Prior to the laboratory's beginning in 1967, the labs 6,800 acres were used for agriculture. The oldest structure currently on the site dates from 1912. In 1967 the 6,800 acres were purchased by the state of Illinois. The land was later transferred to what is now the Department of Energy for the creation of Fermilab. The area was largely farmland, with the exception of the small town of Weston, Illinois. The town, now known within Fermilab as the Village, became the headquarters for the administration and construction of the newly formed laboratory.

Existing single-family homes in the Village were repurposed in place or relocated and grouped to serve as offices, laboratories and residences. Premanufactured barn-like structures were erected in the Village to temporarily house machine shops and development facilities. Additionally, many of the barns and farmhouses scattered around the site were also repurposed in place or relocated. The laboratory's current roadway system, rooted in the agricultural and Weston eras, were modified and expanded as needed to support lab development.

The following paragraphs describe the various eras that make up Fermilab's 105-year development history. They provide useful background and data to inform the campus planning process, along with a visual time line.

**60%**

of buildings' square footage is over 40 years old, a total of 1,400,000 square feet.

**222**

of Fermilab's 364 buildings are over 40 years old.

**35%**

of Fermilab's current buildings were already on site at its founding.

To provide a framework to help understand, organize and assess the many buildings and structures on the campus, the planning team placed them within the context of their time of construction. Each era possesses rather distinct history and character. The eras and descriptions follow.

**The Farm (1912-1962):** In 1967 Fermilab came into possession of its 6,800-acre property. The land, developed from 1912 through 1962, was used for farming. The 55 farmhouses and barns presented an opportunity for the startup laboratory. They were repurposed for laboratory use, primarily as staff housing and storage. These structures, now 50 years older, have been in continuous use since.

**The Suburb (1963-1968):** Throughout the 1950s and 1960s Chicago-land suburban development rapidly expanded westward.1963 saw the creation of the tiny town of Weston, Illinois, a residential subdivision within the bounds of what became Fermilab. The 100 or so new homes were repurposed for laboratory use. Individually, and relocated into clusters, they became housing, laboratories, offices, the Users Center and the children's daycare. In continuous use since, many house prime candidates for consolidation and relocation into modern facilities.

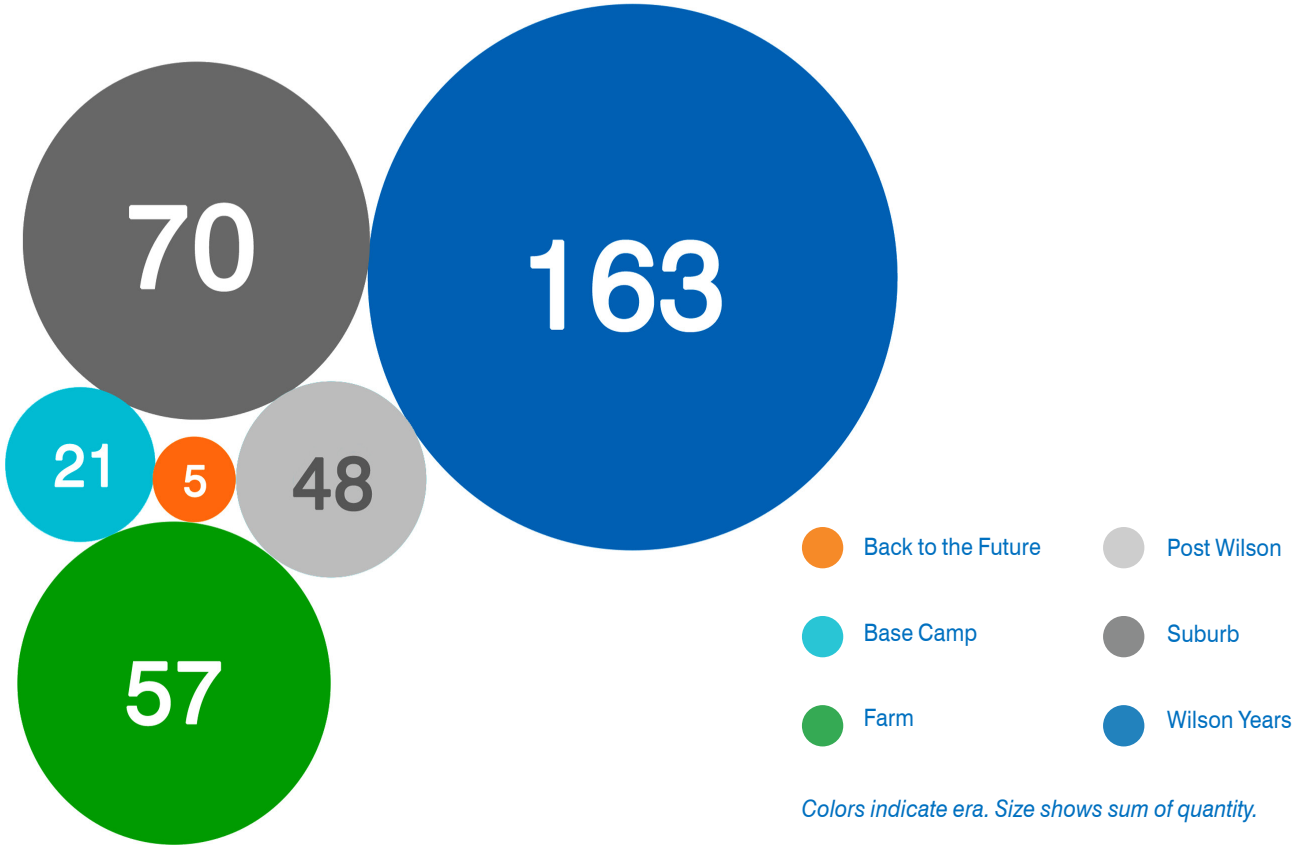
**Base Camp (1969-1970):** Like a frontier outpost, the base camp structures were intended as temporary buildings to house, direct and execute the activities necessary to build the permanent laboratory facilities. Augmenting the repurposed and reconfigured farm and suburb structures, base camp structures are premanufactured metal barn-like buildings housing machine shops and laboratories. While intended for short term use, these antiquated and inadequate buildings continue in use, awaiting modern replacement facilities.

**Wilson Years (1971-1993):** The Wilson Years encompass 67% of the lab's total above-grade square footage. Designed and constructed as the permanent laboratory, this era includes Fermilab's iconic structures: Wilson Hall, Feynman Computing Center, NML, Meson Lab and the Industrial Center Buildings. Also built in this area are the original colorful, playful service and support buildings, with their bright colors and painted circles, as well as the sculptures, and pi poles. Guided by the creativity and enthusiasm of Robert Wilson and the resident artist Angela Gonzales, the Wilson Years epitomize his founding vision for the campus. Collectively, they contribute greatly to what has become the "unique character of Fermilab."

**Post-Wilson (1994 -2008):** The Post-Wilson era derived from the Wilson Years, but in significant ways is very distinct. The colorful and energetic buildings of that founding era were evidencing deficiencies in durability, maintainability and flexibility. Thus, the dozens of new buildings designed and constructed post-1994 for the Main Injector project prioritized practicality over the aesthetic ambitions of earlier times. As purely utilitarian structures they eschewed the colorful motifs and details of the Wilson Years, opting instead for uniform neutral siding. Each building looked just like the others. This Main Injector design approach became the de facto pattern for all building designs well into the 21st century. As time has progressed they have met their practical objectives well. However, many at Fermilab desire to recapture the founding spirit and energy evident in buildings of the Wilson Years.

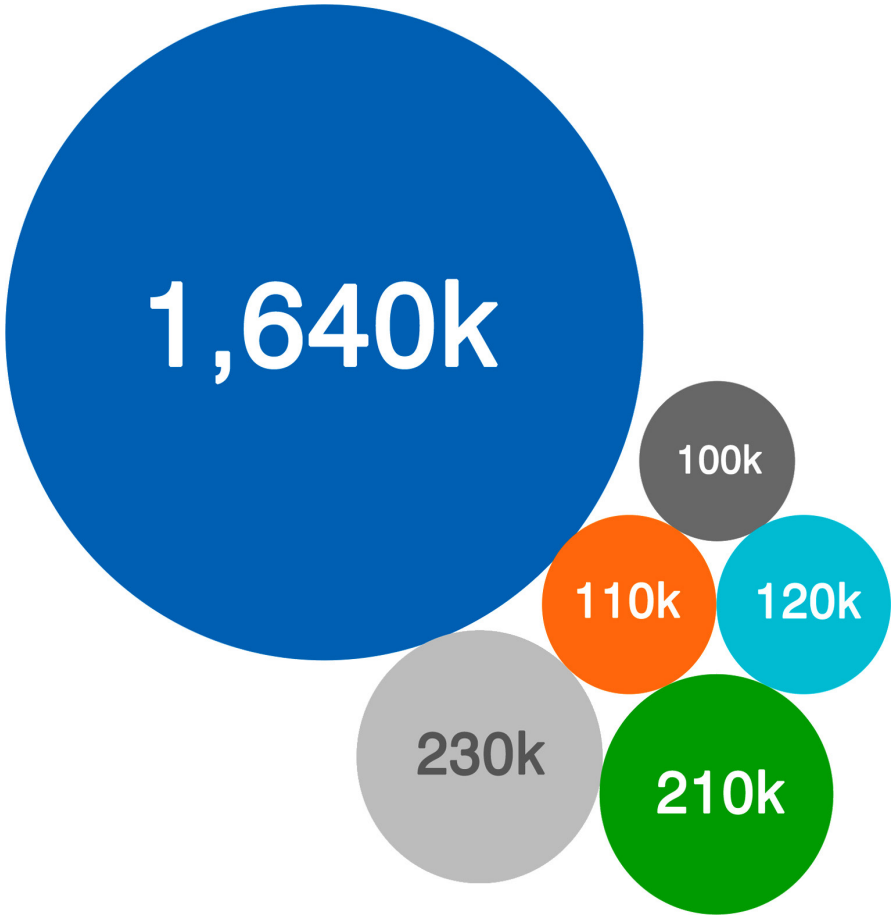
**Back to the Future (2008-2014):** Back to the future, while whimsical, captures this somewhat ambiguous era. Recent development, while thoughtful and creative, was carried out without a consistent, modern campuswide approach to siting and design. One reason for the campus plan is to address this void and provide direction for the future. Later chapters of the FCMP and appendix delineate initiatives and design guidance to alleviate ambiguity and provide direction for future development.

**Building quantity by era:** Fermilab contains 364 buildings. The diagram below illustrates the number from each development era.




*Colors indicate era. Size shows sum of quantity.*

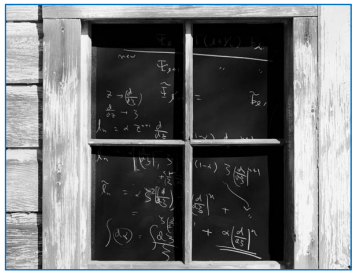
**Building area by era:** Fermilab contains 2,490,000 SF of buildings. The diagram below illustrates the square feet built in each development era.




Back to the Future
Post Wilson
Base Camp
Suburb
Farm
Wilson Years

*Color indicates era. Size shows sum of area.*

1900



*The 57 farm buildings comprise 210,000 sf of floor area, 9% of Fermilab's total square footage and 16% of the numerical total of buildings on site.*

## The Farm
*(1912-1962)*

## The Suburb
*(1963-1966)*

*The 70 facilities of this era comprise 100,000 sf of floor area, 4% of Fermilab's total square footage and 9% of the numerical total of buildings on site.*

*The Founder Robert Wilson*

*The 21 Base Camp era facilities comprise 120,000 sf of floor area, 5% of Fermilab's total square footage and 6% of the numerical total of buildings on site.*

## Base Camp
*(1969-1970)*

## Wilson Years
*(1971-1993)*

*The 163 Wilson Years buildings comprise 1,640,000 sf of floor area, 67% of Fermilab's total square footage and 45% of the numerical total of buildings on site.*

## Back to the Future
*(2008-2014)*

*The five Back to the Future era buildings comprise 110,000 sf of floor area, 5% of Fermilab's total square footage and 1% of the numerical total of buildings on site.*

## Present

*The 48 Post-Wilson era buildings comprise 230,000 sf of floor area, 10% of Fermilab's total square footage and 13% of the numerical total of buildings on site.*

## Post-Wilson
*(1994-2008)*

# Guiding Principles

A plan is a set of actions conceived to achieve some desired outcome. To create a master plan, the desired outcome must be clearly understood.

Twenty-first-century science needs a 21st-century laboratory. What does that mean? How will it look and feel? How is it organized? What does it imply about the current state of the laboratory? Where does the lab fall short? What is missing?

To provide answers, the Fermilab master planning team developed the *Guiding Principles* for the Campus Plan. These seven principles provide the underpinning ideals for the plan. They bring the values, needs and qualities envisioned for a 21st-century laboratory.

**Support Cutting-Edge Research:** The laboratory strategic plan describes how to use the laboratory's existing world-class accelerators and infrastructure and build new capabilities to support groundbreaking particle physics and accelerator science research. Campus planning and development projects will be driven by the priorities delineated in this strategic plan.

**Enhance the Campus Experience:** Fermilab's campus shall contain a diversity of inviting, accessible and safe places for the enjoyment and interaction of staff and visitors. Improvements will be made to pedestrian walkways and bicycle paths to increase safety, improve functionality and enhance opportunities for cultural and social engagement.

**Reinforce Community:** Central to the scientific mission is the desire to foster a sense of community. The Campus Plan shall enhance the community building aspects of the laboratory by designing buildings and open spaces that bring together researchers and staff. This should result in the creation of vibrant centers of laboratory life, fostering the free exchange of ideas and enabling teamwork and collaboration.


**Ensure Integrative Planning and Design:** The planning and design of the campus shall integrate disciplines, connect communities, and coordinate scientific and supporting development with mobility, wayfinding, landscape and infrastructure initiatives.

**Promote Stewardship:** Fermilab shall respect and manage the physical environment of its campus facilities and lands for the health and well-being of the laboratory, its staff, users, neighbors and visitors, and the ecosystems supported by the laboratory. Facilities should be designed and built in accordance with applicable guidelines for state-of-the-art sustainable design and energy conservation.

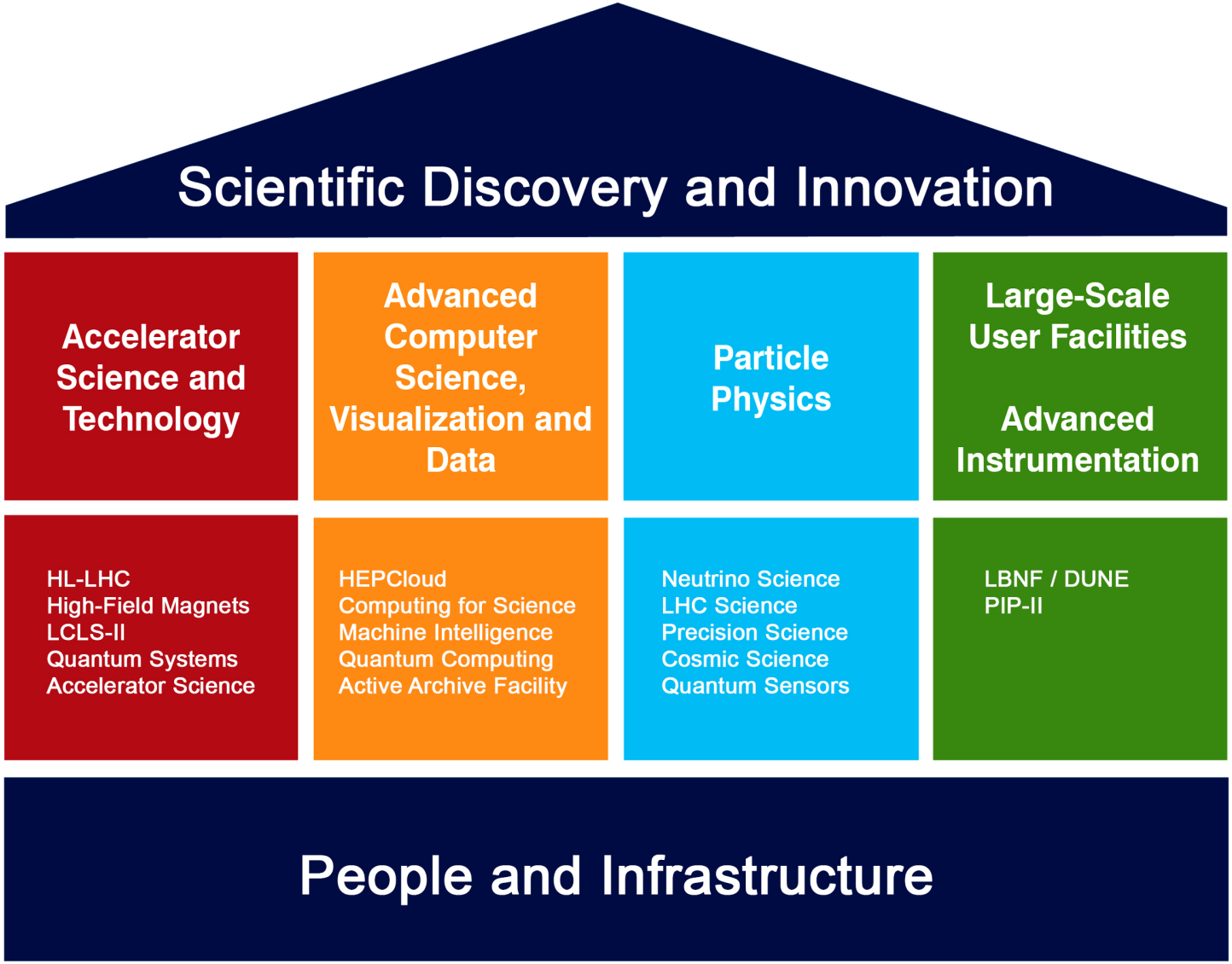
**Ensure the Campus is Welcoming to Visitors:** Fermilab has a long and important legacy as a place for science education and community outreach. An enriching experience for visitors is an important element of Fermilab's mission. The Campus Plan should provide a welcoming entrance and clear designation of visitor areas. The planning and design of the campus should consider the visitors, education and outreach in all aspects. Displays should promote the unique qualities of the site and explain what it has to offer in terms of science and nature.

**Uphold the Unique Character of Fermilab:** The laboratory has a tradition of architectural innovation and excellence defined by the founder's vision of "a Utopian place where physicists from around the globe could work in functional surroundings reflective of the magnificence of their discoveries and theories." This is evident in the design of many of its founding-era buildings and structures, representing architectural innovations for their time. The Campus Plan should perpetuate the founding vision while acknowledging what has changed in terms of science, values and performance since the founding of the laboratory.

# Strategic Plan

Developing a plan for the future of Fermilab's campus and facilities is driven by the laboratory's Strategic Plan, which is built around Fermilab's four core capabilities: 1) Accelerator Science and Technology 2) Advanced Computer Science, Visualization and Data 3) Particle Physics and (4) Large-Scale User Facilities. These are defined by criteria established by the U.S. Department of Energy Office of Science (DOE/SC) and are leveraged to support the DOE/SC Scientific Discovery and Innovation mission.

Fermilab's major science and technology initiatives stem from the core capabilities and are aligned with the Particle Physics Project Prioritization Panel (P5) plan, DOE and the science community. High-intensity particle beams are used to answer compelling questions in neutrino science and reveal new physics phenomena through high-precision tests of the Standard Model of particle physics. High-energy particle beams are used to discover new particles and probe the architecture of the fundamental forces of nature. Underground experiments as well as telescopes are used to uncover the natures of dark matter and dark energy and probe the cosmic microwave background. Fermilab's strategy for supporting its core capabilities is called "Building for Science" and focuses on mission-based priorities related to people and infrastructure. Infrastructure is the focus of the Fermilab Campus Master Plan.


Scientific Discovery and Innovation
Accelerator Science and Technology
Advanced Computer Science, Visualization and Data
Particle Physics
Large-Scale User Facilities
Advanced Instrumentation
HL-LHC
High-Field Magnets
LCLS-II
Quantum Systems
Accelerator Science
HEPCloud
Computing for Science
Machine Intelligence
Quantum Computing
Active Archive Facility
Neutrino Science
LHC Science
Precision Science
Cosmic Science
Quantum Sensors
LBNF / DUNE
PIP-II
People and Infrastructure

# Current Perspectives

The planning team embarked on a critique of the current campus to understand how it measured up to the *Guiding Principles.* This critique was approached from two directions. The first was internal. We engaged Fermilab staff and management on the campus's needs and its direction for the future. The second involved gaining outside perspectives. Fermilab management engaged the services of John Ronan Architects, a noted Chicago design firm. Mr. Ronan provided observations based on his expertise of state-of-the-art campus and building design. Outside critique and working sessions were also conducted with the university architect from the University of Chicago. The resulting Current Perspectives represents the outcome of these studies.

**Fermilab employees and visitors appreciate the spirit in which the campus was originally designed and would like it upheld.** The laboratory should continue to recognize and enhance the founder's Utopian vision, on which Fermilab was based and which informed its early design.

**Some of the founding spirit seems to have been lost in the utilitarian and backward-looking design of the post-founding-era buildings and utilities.** Site development and building design during the post-founding era has been implemented around economy-oriented limitations and replications of the original buildings. This process has resulted in a site including many rather nondescript, utilitarian structures.

**Many of the founding-era buildings are not conducive to the workplace expectations of current and future generations of researchers.** Many of the early buildings do not prioritize quality of life or contribute to a sense of place. Many of the buildings housing scientists and staff members feel as if they were designed from the outside in, prioritizing image or representation over improving experience and quality of life. They do not have usable outdoor spaces or clear and welcoming entrances.

**The campus is not pedestrian-friendly.** Like many offices and industrial campuses developed in the postwar period, the Fermilab campus was designed and meant to be experienced by automobile. Minimal accommodations exist for pedestrian travel. This conflicts with the sense of community Fermilab seeks to create among its scientists and staff members.

**Some of the existing buildings tend to dominate, as well as distract from, the laboratory's natural landscape.** The natural landscape is a significant identifying characteristic of the Fermilab campus, making it unique among laboratories. The design of current buildings is not responsive to or well integrated with the landscape.

**Many of Fermilab's aging and inadequate facilities will need to be updated or replaced to accommodate the laboratory's scientific program plan.** Fermilab requires high-quality industrial, high-bay, offices and technical spaces to accommodate the laboratory's scientific program.

**The campus has a haphazard feel due to the scattered nature of the structures, roadways and utilities about the site.** The organizational principle guiding the siting of buildings is unclear and results in a rather random and dissonant overall character.

**The visitor experience needs improvement.** Visitors on campus need to have a more welcoming and informative experience. The campus has weak entry points that are easily missed and do not convey a sense of arrival. The overall entry sequence is not a welcoming experience. Public areas of the campus are not distinguished from private areas, and it is not clear which campus areas and buildings are open to the public and which are off limits. Additionally, it is difficult for an outsider to understand what happens at Fermilab, and it is currently possible to pass through the site unaware that any scientific research is taking place.

**Fermilab needs to facilitate a more international and collaborative environment.** From its founding in the village of Weston, Illinois (now the Village), Fermilab has developed in a geographically dispersed manner. This barrier to collaboration extends to our scientist guests, who often come from abroad for both short- and long-term visits. During their stay at the laboratory, they should feel that they are an active part of the laboratory's research environment, a goal that is currently hampered by their wide physical separation from the scientific centers of the laboratory.

**The laboratory should use space efficiently.** The laboratory should strive toward alignment with comparable research institutions, generational and industry reference points and national laboratory trends. Additionally, buildings tend to be categorized by organization and divisions, thereby not taking advantage of the possibilities and benefits of shared space.

**The main entrance needs improvement.** The main entrance at Pine Street, aside from the sculpture "Broken Symmetry" by Robert Wilson, is unimpressive and disorienting to the uninitiated. One is not sure whether he can enter, and there is minimal indication as to what Fermilab is.

**The vehicular circulation and wayfinding is inadequate and unclear.** The transportation and circulation system also present sseveral challenges. The roadway layout was initially based on pre-existing rural roads. New roads were then added to access the experiments. Additionally, raised-earth berms shielding the Main Ring and linear accelerators, along with new and planned berms, interrupt roads and require alternative circuitous routes to get around campus. Building identification and wayfinding signage throughout the site is minimal, inconsistent and inadequate.

# Twenty-Year Vision

The Campus Plan is based on a long-term vision of what the Fermilab Campus can become and how it might look, feel and function 20 years from now.

**State of the art:** Buildings will be state-of-the-art places representing and furthering the advancement of Fermilab's ongoing research.

**Welcoming and international:** Campus improvements will continue to transform Fermilab into an ever more welcoming and international community of researchers.

**Open and green:** Consolidation of buildings will help preserve Fermilab's rich and diverse natural areas and make available other areas for future large-scale physics machines.

**Consolidated and integrated:** Currently diffuse facilities will be condensed into the central campus. Creativity and innovation will flourish as researchers and staff mingle in this distinct and vibrant place of research and collaboration.

**Connected and engaged:** The campus will be connected by various modes of transportation: walking, biking and, possibly, a campus shuttle.

**Built on the legacy:** the campus will embody Wilson's optimism of a "A Utopian place where physicists from all parts of the country, and from all countries, would be doing their creative thing in an ambience of well-functioning and yet beautiful instruments, structures and surroundings that would reflect the magnificence of their discoveries and theories….", and his "fantasy of a Utopian laboratory clearly required a setting of environmental beauty, of architectural grandeur, of cultural splendor…"

**Innovative and significant buildings and structures:** New structures will embrace Wilson's aim: "I had better pay close attention to the architecture of the project, for I was determined that it be significant yet affordable. If we produced a dowdy site with shabby buildings, then the technical people we wanted to work with us would not come and the statesmen, who might judge us in part by appearances, would not in the long run give us the funds that we would need for our physics." In a fresh and innovative ways, it will attract the next generation of international researchers.